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SEQUENCE OF DISCRIMINATION AND DIFFERENTIATION TRAINING IN THE TEACHING OF FRENCH IN THE EARLY PRIMARY GRADES. FINAL REPORT.

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THE PROBLEMS OF INSTRUCTION IN THE PHONOLOGY OF A SECOND LANGUAGE WERE INVESTIGATED. THIS REPORT DEALS PARTICULARY WITH THE PROBLEM OF SEQUENCE OF DISCRIMINATION AND DIFFERENTIATION TRAINING IN FRENCH INSTRUCTION IN THE PRIMARY GRADES. THE BODY OF THE REPORT PRESENTED THE THEORETICAL FRAMEWORK, A DETAILED STATEMENT OF THE PROBLEM, THE DESCRIPTION OF THE EXPERIMENTAL PROCEDURE, RESULTS, AND CONCLUSIONS FOR THE PROJECT. THE APPENDIXES INCLUDED (1) THE INSTRUCTIONAL FRENCH PROGRAM FOR EXPERIMENT 1, (2) THE PROGRAMED MATERIALS FOR EXPERIMENT 2, (3) THE REPLICATION STUDY, AND (4) THE SUMMARY OF THE FINAL REPORT. (GC)

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March 1965

sequence of discrimination and differentiation training in the teaching of french in the early primary grades

by
LAWRENCE L. MACE
and
EVAN R. KEISLAR

THE FINAL REPORT
ON
RESEARCH PERFORMED UNDER CONTRACT WITH
THE U.S. OFFICE OF EDUCATION
DEPT. OF HEALTH EDUCATION AND WELFARE
NDEA, TITLE VI, CONTRACT NUMBER OE-3-14-022
EVAN R. KEISLAR, PRINCIPAL INVESTIGATOR

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Sequence of Discrimination and Differentiation Training in the Teaching of French in the Early Primary Grades

by

Lawrence L. Mace and Evan R. Keislar

March 1965

The Final Report
on
Research Performed under Contract with
the U.S. Office of Education
Department of Health, Education and Welfare
NDEA, Title VI, Contract Number OE 3-14-022

Evan R. Keislar, Principal Investigator

FOREWORD

The project being reported is the second in a series of investigations dealing with the problems of instruction in the phonology of a second language. The first of these was entitled "Preliminary Discrimination Training in the Teaching of French Pronunciation."[1] As an outcome of this first investigation, the present project was formulated to deal particularly with the problem of sequence of discrimination and differentiation training in French instruction in the primary grades.

The major part of this final report was prepared by Lawrence Mace, Research Associate for the project. Dr. Mace was primarily responsible for the planning and execution of the project while the principal investigator was on leave at the Center for Advanced Study of the Behavioral Sciences during the year 1963-64. In the body of the report are presented the theoretical framework, the detailed statement of the problem and the description of the experimental procedure, results and conclusions for the project.

The results of the major experiment of the project, Experiment I, dealing with the question of sequence of listening and speaking, were so dramatic that a replication experiment was designed and carried out with improved instructional controls and experimental designs. The report of this replication study, testing for the second time the major hypothesis of the project, is to be found in Appendix C. This second experiment, conducted by the principal investigator and Carolyn Stern, not only supported the results of the first, but eliminated some of the alternative interpretations which had been previously possible.

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[1] NDEA, Title VI, HEW, SAE 8950, Evan R. Keislar, Principal Investigator.

At the very end of this document, in Appendix D, is presented a general summary of the present project as well as the previous investigation from which it stemmed. This section, prepared primarily by Evan Keislar, the principal investigator, outlines an operational approach to the general problem of instruction in speaking and listening in a foreign language. Within this framework the five major experiments of the two investigations are briefly reviewed. The general implications of this work for the field of foreign language instruction are outlined.

It should be noted that the two-week program in speaking and listening, prepared by Dr. Mace, is presented frame-by-frame in Appendix A in Section I. Although the space required is extensive, the information presented on these pages will permit the reader to note practically every aspect of the two weeks of instruction which the children in this investigation were given in both the major experiment and its replication. Furthermore, future investigators will be able on the basis of this detailed description to recreate, if desirable, the auto-instructional program used for this experiment.

There are many persons who should be given recognition for their part in making this research possible. First and foremost, the writers wish to extend their appreciation to Mr. Thomas Reece, Assistant Superintendent of the West Los Angeles Elementary School District. For many years Mr. Reece has shown a deep interest in educational research. He has helped provide arrangements within his District for the conduct of research studies in the elementary grades. Furthermore, he takes pains to keep his administrators and teaching staff alert to new research developments in the field of education.

The forward looking administration of Mr. Reece is reflected in the schools where these experiments were conducted. Special appreciation is due to Mrs. Margaret Flemming, the Principal of the Castle Heights Elementary School and her staff; to Mrs. Margie Cahn, who was then Principal of the Overland Elementary School; and to Mr. Ira Gilbert, Principal of the Nora Sterry Elementary School. For the replication study special thanks are due to Miss Dorothy Troeger, Principal of the Canfield Elementary School. To all these Principals and their teaching staff special appreciation is due. They cheerfully adjusted their schedules to the demands of research design and offered helpful suggestions at many points which contributed to the conduct of the study.

A special note of recognition must be given to Dr. Carolyn Stern for her part in the replication experiment. Dr. Stern, with wide experience with young children, was responsible for the revision of Dr. Mace's program so that it would be adapted for the improved instructional procedures used in this second experiment. She carried out the study in the schools and was responsible for the processing of the data. Mrs. Barbara Stevens provided excellent assistance to Dr. Stern in this task.

Dr. Paul Pimsleur, language consultant for the project, offered valuable suggestions with respect to the planning of the study. We are deeply indebted to his very helpful technical advice in the field of foreign language instruction.

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ABSTRACT

Sequence of Discrimination and Differentiation Training in the Teaching of French in the Early Primary Grades

The central problem of this investigation involved the processes of response differentiation and stimulus discrimination in learning to speak and understand the French language. The central question of the investigation was whether with children in the primary grades, speaking training followed by listening comprehension training in beginning French was superior to the same instruction in the reverse sequence.

In the major experiment of the investigation, Experiment I, the instructional treatment involved: (1) Five days of speaking training which emphasized the echoic differentiation of vocal responses; children learned to speak the appropriate French utterance to describe a picture. (2) Five days of listening comprehension training which stressed discrimination control of aurally presented utterances as stimuli; children learned to select the picture which was described by the French utterance they heard.

This program of French instruction, consisting of a total of 600 frames, was presented automatically in ten daily fifteen-minute lessons to 108 first, second, and third grade children, assigned to four treatments as follows: I, the five 60-frame daily lessons of speaking training first; II, the five 60-frame daily lessons of listening

comprehension training first; III, daily lessons of concurrent training, alternating 15-frame segments of speaking and listening comprehension with speaking segments first; and IV, concurrent training as in III, but with segments of listening comprehension first. At the end of training, and again two weeks following training, the speaking-first groups excelled the listening comprehension-first groups on the test of listening comprehension. No reliable differences were found on the speaking test.

To test this major conclusion under improved instructional conditions, and experimental design, a replication study was carried out with 98 third grade children. Replacing the two concurrent groups were two groups who were given only listening training, one during the first week and one during the second. The results demonstrated that the speaking-first group was superior to the listening-first group on a listening test not only at the end of instruction, but also one month later. Furthermore, this superiority was upheld, at the .05 level of confidence, even three months later not only on the test of listening but on the test of speaking as well. The replication study dramatically confirmed the findings of the first experiment.

The findings of the major experiment were extended in another study by exploring the relationship between number of vocabulary skills established by training and the facility of learning other vocabulary skills. For three French vocabulary items, 100 third grade children were given preliminary training in three skills which emphasized the differentiation of vocabulary responses. Then, assigned to five treatment groups, the subjects received training in 0, 1, 2, 3, and 4 additional skills respectively. By repeating different amounts of preliminary training, total stimulus exposure and response practice were equated for all groups. The results showed that following training, an increasing linear function was shown between number of additional skills established by training and performance during a test-task of listening comprehension.

In interpreting these findings, we may note that speaking may add to the distinctiveness of the auditory stimuli by a process of labelling, thus making listening comprehension more effective when given later. Since stimulus and response functions are reversible in this paired-associate type of learning, it is possible that the facilitation in one direction is greater than in the opposite. In any case the evidence from this investigation supports the proposition that, with instructional materials and subjects similar to those in this experiment, speaking in the foreign tongue should be introduced at the beginning of second language instruction.

CHAPTER I

INTRODUCTION

The concepts of response differentiation and stimulus discrimination provide a powerful pair of tools for analyzing the process by which language behavior is learned. New language responses become available to the individual as a result of response differentiation; these new responses come to be made under appropriate environmental conditions through stimulus discrimination.

Response differentiation in language learning. The differentiation of language responses has the language behavior of a particular community as its criterion. For instance, if an individual makes utterances which are similar to those in his language community, he is likely to be reinforced for doing so by the members of that community.

The precision with which his utterances correspond to those of this community depend upon the contingencies of such reinforcement. In the early stages of learning, an utterance which only vaguely resembles its properly articulated counterpart may be followed by reinforcement; later, reinforcement is withheld unless the utterance resembles the final form more closely. In this way the community shapes the utterances of its members to fit definite specifications.

At first any gross approximation to a final form of response is accepted. But the standards for acceptable performance are raised successively, with reinforcement contingent upon each of these successively higher standards, until the required form of the response is approximated closely.

The stringent requirements of the language community in shaping clearly identifiable language responses is essential. In order for language to function, the individual must learn to make an extremely large number of responses, each of which is recognizably different from the others. By response differentiation, the language responses of the individual are "made different from one another" so that they may produce differing effects on the individual's language environment.

Stimulus discrimination in language learning. The procedure of reinforcing successive approximations to a final form of response is essential to response differentiation in language learning. It is by this procedure that the particular language responses of a community become available to the individual. But differentiated responses must come to be emitted upon certain occasions and not upon others. Again, the community provides the standards for the occasions when a particular language response is appropriate.

For example, a young child who has learned to say "da da" may emit this response in the presence of his father and will be reinforced for doing so by attention and approval from his proud parent. But the child's response "da da" also may be occasioned by the presence of any other adult before the child has learned to discriminate. Such inappropriate behavior is accepted when the child is young, but as time passes the child will receive reinforcement only when his response "da da" is occasioned by the appearance of his parent, and never by the appearance of the milkman!

Such training epitomizes the procedure by which stimulus discrimination is established. The individual learns to discriminate among stimuli as members of his language community reinforce a language response in the presence of a particular stimulus, and withhold reinforcement or punish the response in the presence of other stimuli. It is in this way that the community brings the language responses of the individual under the control of specific features of his environment. A feature of the environment becomes a discriminative stimulus, acquiring control over a particular language response, as this stimulus becomes a "signal" that the response is likely to be followed by reinforcement.

The interdependence of differentiation and discrimination. While response differentiation and stimulus discrimination may be separated in order to analyze the problem of language learning, it must be pointed out that these two processes do not occur independently in any language learning situation. Indeed, it is the general purpose of the present effort to further understanding of the interdependence of these processes. Thus an attempt has been made to study certain empirical relationships between the learning of language responses by response differentiation, and the appropriate environmental control of these responses as a result of stimulus discrimination.

Language research and second language instruction. In order to study language learning experimentally, tasks are necessary which require the differentiation of new language responses and discrimination among new language stimuli. Learning a second language provides such tasks. Also, effective second language instruction has become a current educational concern and teachers are looking to language specialists for techniques and concepts which are useful for improving instruction. Unfortunately, there is a dismal hiatus between much language research and theory as presented in the scientific journals and the procedures and conceptions which teachers may use in the language classroom. In general, there is a dearth of clear research findings which imply the relative effectiveness of alternative teaching procedures and suggest new ones. These considerations have prompted the present investigation. Learning French has been selected to provide tasks which may be used to study the processes of response differentiation and stimulus discrimination in language learning. An underlying concern is that the findings of the study may suggest effective procedures and clarify conceptions which are useful in language teaching.

Purpose and preview of the study. The fundamental purpose of the present investigation is to explore the way in which stimulus discrimination and response differentiation enter into learning French language skills. Two experiments have been carried out to achieve this purpose. The first experiment was done to study the optimal sequence of stimulus discrimination and response differentiation training in learning two French skills. This experiment is described in Chapter II. The second experiment studies the facilitative effect of establishing certain discriminations among French language stimuli on learning other discriminations. Chapter III is devoted to this experiment. The rationale of the experiments is presented in Chapter IV. Chapter V reviews selected related literature and research and discusses interpretations of the experiments. The study is summarized in Chapter VI, and implications are considered.

CHAPTER II

SEQUENCE OF DIFFERENTIATION AND DISCRIMINATION TRAINING IN LEARNING TWO FRENCH SKILLS

Sequence of Learning Language Skills

A current widely accepted view among language specialists holds that a particular sequence of training should be followed for the most effective learning of language skills. Many linguists and language instruction experts are advocating the following sequence: listening comprehension, speaking, reading, writing. Nelson Brooks, a leading proponent of this view, argues as follows:

> The learner's activities may be briefly summarized as follows:...he is to hear much more than he speaks, he is to speak only on the basis of what he has heard, he is to read only what has been spoken, and he is to write only what he has read...(Brooks, 1960, p. 50)

Brooks appears to base his argument on physiological considerations.

> Immediate legitimate objectives of second language learning: (1) the first is training in listening comprehension. Although language sounds originate in the voice box of the throat and are modified into recognizable speech movements in the mouth, it is the ear that dominates the learning and use of speech sound. Ear training must come first. (2) The second objective is the reproduction by the tongue and adjacent organs of the speech sounds the ear has learned to recognize... (3) A third objective is reading, that is, the recognition

> of speech symbols, not as sound waves striking the ear, but as graphic signs on the printed page. (4) Along with this is a fourth objective, writing, the ability to reproduce these graphic sounds in accordance with accepted standards in the new language. (Brooks, 1960, p. 107)

No clear empirical evidence was found in the literature concerning the relative effectiveness of this sequence over other possible ones; in fact, very few studies were located which investigated sequence per se as an independent variable. (These studies are reviewed in Chapter V.) Such statements by workers in language instruction appear to be based largely on opinion and practical teaching experience.

Psychologists have also expressed opinions which imply the importance of sequence. For example, Underwood and Schulz (1960, p. 92) in Meaningfulness and Verbal Learning, suggest that there are two "stages" in paired associate learning. In the first response learning stage, responses are "integrated" into verbal units. In the second hook-up or association stage responses become connected to particular stimuli. The implication of this view for language learning is that the responses of speaking and writing should be "integrated" before they are connected to particular stimuli in listening comprehension and reading. B. F. Skinner (1957, p. 21) also distinguishes the "shaping" or differentiation of a language response (a verbal operant) from the control of such a response by a discriminative stimulus or feature of the environment which "sets the occasion" for this response. This might also imply that a given language response should be learned before the student learns occasions when it is appropriate.

Thus, opinion would appear to be mixed on the question of the optimal sequence of learning language skills. Should training in skills emphasizing response learning (speaking and writing) precede training in the skills which emphasize bringing these responses under control of appropriate stimuli (listening comprehension and reading) or should the reverse of this sequence be followed? A third possibility is that some combination of concurrent training in the various language skills might produce the most effective learning.

Optimal Sequence of Training in Two French Language Skills

An experiment (Experiment I) was designed to study the relative effectiveness of different sequences of response differentiation training and stimulus discrimination training in language learning. For the experiment, it was necessary to select learning tasks which required the discrimination of new stimuli and the differentiation of new language responses. Instruction in French provided these tasks. For the purpose of the experiment, French instruction was limited to speaking and listening comprehension, since speaking emphasizes the differentiation of new language responses while listening comprehension does not. Writing and reading require analogous training, but these skills present problems beyond the present problem of sequence. (One of these problems, which concerns the relationship of writing and reading to speaking and listening comprehension, is considered in Experiment II presented in the next chapter.) It was also desirable that subjects chosen for the experiment have a minimal background of formal language training. Children in the early primary grades met this requirement. Instructional materials used in the experiment were programmed and presented automatically to ensure standardized conditions.

Operational definition of terms. The differentiation of new language responses would be strongly implied by a narrow definition of "speaking" French. According to such a definition, if a subject could merely articulate an utterance such as *le garçon* so that it was comprehensible to a French listener, one might say that the subject could "speak" this portion of the language. However, this definition of speaking probably would not be generally acceptable and it would have been too limited for the purposes of the present experiment. Accordingly, a broader definition of *speaking* was used: A subject "speaks" French to the extent that his utterances in this language are both comprehensible to French listeners, and are also appropriate to the situations in which they occur. Thus, if a subject articulates *le garçon* in a manner which is comprehensible to a French listener when a picture of a boy is presented he speaks this part of the French language.

For the purposes of the present experiment, *listening comprehension* of a French utterance was defined by the appropriateness of a subject's response to an utterance. Thus, a subject meets the criterion of listening comprehension when he reliably selects the picture of a boy from available plausible alternatives when he hears a French speaker say *le garçon*, and does *not* select this picture when he hears other utterances such as *le chien* and *la fille*. This definition of listening comprehension emphasizes the importance of the process of *stimulus discrimination* in language learning, suggesting that a certain stimulus evokes a particular response while other stimuli do not.

Problem and experimental design. The purpose of Experiment I was to study the optimal sequence of training in two French language skills, *speaking* and *listening comprehension*. The general problem could be stated by considering four alternative possibilities. For most efficient learning, either (1) speaking should precede listening comprehension, or (2) listening comprehension should precede speaking. When either speaking or listening comprehension is first, there are two further alternatives, either (A) massed pretraining in one of the skills, or (B) concurrent training in the two skills alternating brief training sequences of speaking and listening comprehension.

These alternative possibilities suggest a two-way factorial design with subjects assigned to four experimental treatment groups. This design is summarized in Figure 1.

A ten-lesson instructional program provided necessary training materials in speaking and listening comprehension. Four forms of these materials were prepared for the four treatment groups: Group Sp materials consisted of five lessons of speaking followed by five lessons of listening comprehension; Group LC materials consisted of five lessons of listening comprehension followed by five lessons of speaking; Group Sp/LC materials presented speaking and listening comprehension concurrently by alternating brief sequences of each; Group LC/Sp materials also presented concurrent training, but differed from Group Sp/LC materials by reversing the brief sequences so that speaking preceded listening comprehension. Thus, by using the same program for all materials the overall content of the materials for each experimental group was identical; only the sequence of presentation was varied.

Development of programmed materials. Listening comprehension and speaking sequences were first constructed and tested with individual subjects. Their performance indicated necessary revision and also helped to suggest whether content was appropriate. The program was tested in this preliminary fashion using children from grades 1-5.

	A Massed Pretraining	B Concurrent Training
1 Speaking first	Group Sp	Group Sp/LC
2 Listening Comprehension first	Group LC	Group LC/Sp

Figure 1

Factorial Design
for Experiment I

Sequences were then tested with small groups of subjects. Revision continued until ten twelve-minute sequences or "lessons" had been developed which were suitable for subjects of the third grade level. This final program consisted of five lessons of speaking training and five lessons of listening comprehension training. Each lesson consisted of 60 "frames," thus there were 600 frames in the total program. (The complete program is presented in Appendix A.)

For each of the 300 speaking frames, subjects saw a single picture projected on the screen, as in Figure 2. The subjects responded by making an utterance, then received confirmation by hearing the utterance they should have made. What they said depended on the particular utterance being taught. In the early lessons of the program the appropriate response to the presentation of Figure 2 might be un chien (a dog), while later in the program the required response might be Le grand chien est debout (The large dog is standing).

For each of the 300 listening comprehension frames, subjects were presented with three numbered pictures flashed on the screen, as in Figure 3. They heard an utterance such as La petite fille est assise and selected the appropriate picture from those of the screen. They wrote the number of their selection on a scoring sheet, then received confirmation by hearing the number of the picture they should have selected. Here, the subjects were required to select the small girl

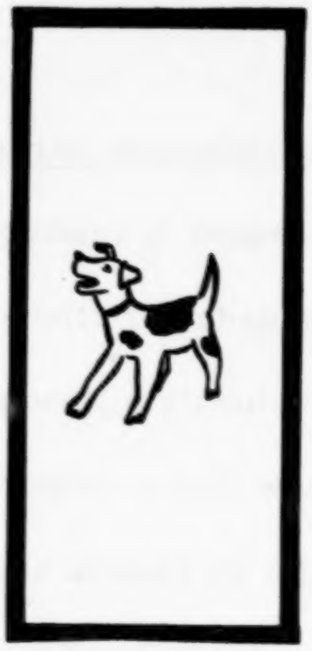

Figure 2

Example of Pictorial Presentations
for Speaking Frames

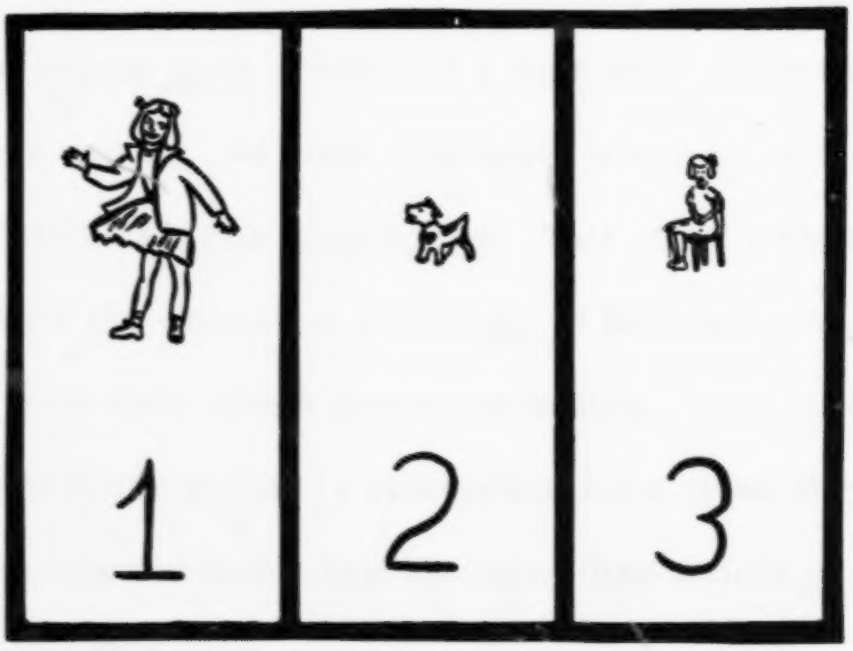

Figure 3

Example of Pictorial Presentations
for Listening Comprehension Frames

sitting, and to write the number three. They received confirmation by hearing "Number three."

Learning French by acquiring grammatical response patterns. The view which guided the development of materials for the experiment was that language learning begins with the shaping of chains of responses brought under the control of specific stimulus presentations. For example, in the instructional program which was developed, a specific utterance such as un chien was shaped by a backward chaining procedure, i.e., teaching the last word of the utterance, then adding the next to last, etc. Thus, a subject was first taught to say chien, then un chien. A picture of a dog projected on the screen was used to control this response. The purpose of this procedure was to begin establishing the response pattern of a masculine noun phrase in which the masculine article un is chained to a noun stem followed by a masculine noun ending. As other utterances which fit this pattern are added, the pattern becomes generalized. That is, if a child begins a noun phrase with the masculine article un, it becomes probable that he will follow a noun stem with a masculine ending. Also, if a noun stem with a masculine ending is appropriate for a given stimulus presentation it becomes probable that the masculine article un will be uttered preceding this noun.

This view of language learning as the acquisition of grammatical response patterns continued to guide the selection and introduction of content in the instructional program which was developed. For example, the pattern for a feminine noun phrase was also introduced. Here, the utterance *une fille* was brought under the control of a picture of a girl projected on the screen. Introducing the verb *C'est* in conjunction with the noun phrase patterns already taught provided the basis for establishing the pattern for declarative sentences such as *C'est un chien*. The noun phrase patterns were now elaborated to include word order and agreement of adjectives. For example, children were taught to emit an utterance such as *C'est un petit chien* when a picture of a small dog was projected on the screen. The affirmative *Oui* and the negative *Non* were taught and combined with declarative sentences to establish a pattern for answering questions. Thus, when a picture of a large boy was projected on the screen and the subjects heard the question *Est-ce un petit chien?* they were taught to answer, *Non, c'est un grand garcon*.

Equipment. For presentation of stimuli, a Wollensak tape recorder was synchronized with a 35 mm. Kodak Carousel slide projector by means of a Kodak Cavalcade programmer. Groups of four to six subjects sat at tables separated from one another by plywood partitions. They listened to taped audio materials through earphones and watched the visual presentations which were projected on the screen before them. The plywood partitions and the earphones helped to limit social interaction among the subjects.

Subjects. The subjects were 108 children from six classrooms: 41 first graders, 43 second graders, and 24 third graders. Many of the subjects were from Japanese homes (56%) or Mexican-American homes (21%). However, all subjects were judged by their teachers to be capable of following instructions in English. None of the subjects had a French language background. The school is located in a lower-middle class socio-economic neighborhood in Los Angeles, California.

The ten-lesson program of instruction required 10 days. In order to give all 108 subjects this training program in small groups, it was necessary to run 48 of the subjects through the program, then repeat this procedure for the remaining 60 subjects. Two criteria were used to select the 48 subjects for the first administration of the training program: (1) children were excluded who were judged by their teachers to have severe English language difficulty since these children would be handicapped in following instructions in English; and (2) subjects were selected from three first and second grade classrooms from the low and medium I. Q. range, excluding the faster learning children; from pilot observations it appeared that the differential effects of the treatments might be more readily observed in younger, slower learning children. Following the first administration of the instructional program to 48 subjects, the program was administered to the remaining 60 subjects in the experiment. These 60 subjects were not selected on the basis of intelligence as were the first 48 subjects. However, children were excluded who were judged by their teachers to have severe English language difficulty.

Procedure. The 48 subjects selected for the first administration of the experiment were separated into two I.Q. levels, low and medium. The 24 subjects of each level were assigned at random to four treatment groups. Homogeneous intelligence levels were used to add experimental precision to the design. It was hoped that two techniques, the exaggeration of treatment effects produced by using younger, slower learning children, and added experimental precision through the use of intelligence levels, would provide sufficient power to obtain clear results with only 48 subjects. However, results from the first administration of the program were ambiguous and it was necessary to run the remaining 60 subjects. Intelligence levels could not be used in the second administration of the experiment because scheduling of subjects by levels interfered excessively with the daily classroom activities of the subjects.

The first administration of the program consisted of eight groups; there were five subjects in each of the four low I.Q. groups and six subjects in each of the medium I.Q. groups. Each day the four low

I.Q. groups received the four different experimental treatments for that day, then each of the medium I.Q. groups received these four treatments. This procedure continued for 10 days. Following the first administration of the instructional program to 48 subjects, the program was administered to the remaining 60 subjects in the experiment. These 60 subjects were assigned at random to the four experimental treatments, thus providing 12 groups of subjects, three groups in each of the four experimental treatments. The two administrations of the experiment are summarized in Figure 4 which shows the number and grade level of subjects assigned to each of the four treatment groups.

Following the program of French instruction, all subjects were given an achievement test of listening comprehension over the content of the program. This test, consisting of 60 items, was administered to the subjects in groups of six on one school day. Confirmation was not given for these 60 items. The test items were similar to the frames of the listening comprehension portions of the training program. There were three alternative pictures to choose from for 37 items, and six alternatives for the remaining 23 items. Thus for each item the subjects heard an utterance and were expected to select an appropriate picture from among three or six alternatives. Then they wrote the number of the picture they selected on a scoring sheet. A subject's score on this test was the total number of items answered correctly. (The listening comprehension test is presented in Appendix A, p. 166.)

First Administration of the Experiment

		Treatments			
		Sp	Sp/LC	LC/Sp	LC
First and Second Grade	Low I.Q.	5	5	5	5
	Medium I.Q.	6	6	6	6

Second Administration of the Experiment

Second Grade	4	4	4	4
First and Second Grade	6	6	6	6
Third Grade	6	6	6	6

Figure 4

Grade Level and Number of Subjects in
Treatment Groups in Experiment I

The listening comprehension test was administered again two weeks following the end of French instruction. This was done to measure retention of listening comprehension. The test was again given to all 48 subjects on one day. The method of scoring was the same as that for the first administration of the test.

During the two weeks following the first administration of the Listening Comprehension Test, each subject received a speaking test which measured speaking skill achieved through the program. (This test is presented in Appendix A, p.175.) The Speaking Test was administered individually to each of the 48 subjects by a native French assistant sitting behind the subject taking the test. There were 80 items on the test, similar to the frames of the speaking portions of the instructional program. For each item a picture was projected on the screen. The subject spoke into a microphone and his utterance was recorded on a tape recorder as a permanent record of the data. At frequent intervals in the test the subjects were given sample utterances which indicated the nature and length of utterances for succeeding frames. The French assistant listening to the subject's utterances through earphones gave the subject a score for the appropriateness and completeness of the utterance to the picture presented. For example, if a picture of a small boy sitting appeared on the screen, the criterion utterance was: Le petit garçon est assis. The native

French assistant scored the subject's utterance on the basis of this criterion, giving points for each part of the utterance spoken comprehensibly. One point was given for each correct word in the utterance, provided that the word did not occur out of order and that it agreed in gender as required. Thus, five points were possible for the example utterance Le petit garçon est assis; fewer than five points were allowed if a subject's utterance was incomplete or otherwise inadequate. The assistant recorded a subject's score for each item on a scoring sheet. The total number of points received on all 80 items was the subject's final score. There were 324 points possible on the test.

The last test given to all subjects was a test of generalization of listening comprehension to material other than that in the initial training program. (This test is presented in Appendix A, p. .) The format and administration of the Generalization Test was similar to the Listening Comprehension Test. There were 80 items, each item providing three alternative pictures as presented in Figure 5. Three nouns were used: l'homme (the man), la femme (the woman), and l'ours (the bear). The adjectives petit (small), grand (large), assis (sitting), and debout (standing) were used in connection with these nouns. A subject's performance on the Generalization Test depended in part upon how well he had mastered the use of these adjectives

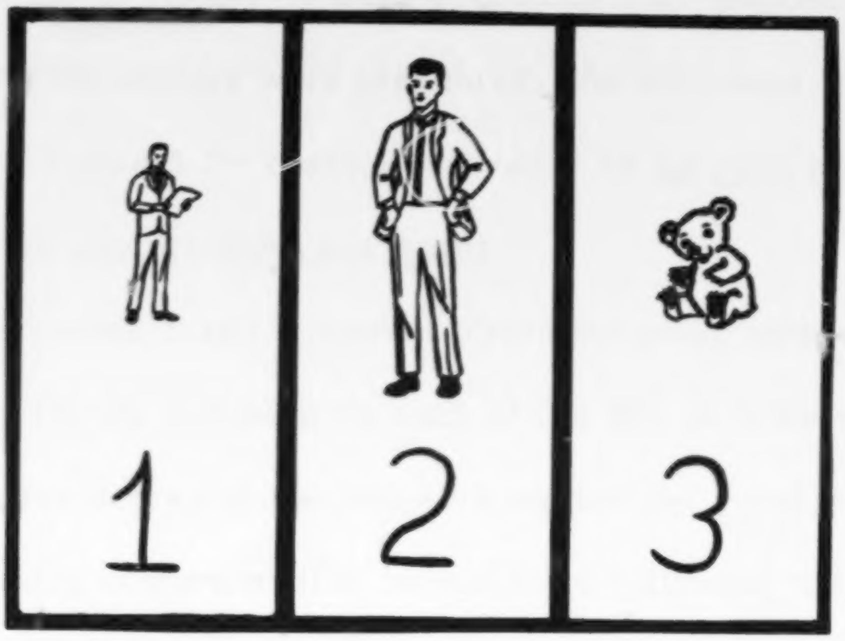

Figure 5

Example of Pictorial Presentations
for Generalization Test Items

during the training program. Performance on this test was also influenced by how well the subject had mastered the grammatical response patterns taught in the program. For 40 of the 80 test items, the grammatical response patterns were the same as those taught in the program. For example, the subjects would hear an utterance such as *L'ours est assis* when the three pictures of Figure 5 were presented. For the remaining 40 items, unfamiliar grammatical response patterns and distracting vocabulary were presented. An utterance accompanying the pictures of Figure 5 for these items might be *Le petit homme est debout avec des papiers dans ses mains*.

Results. Tables 1 and 2 present treatment group means and standard deviations for the subjects on each of the four posttests. These tables summarize scores of the subjects on the four tests which assessed: listening comprehension immediately following instruction; retention of listening comprehension after two weeks; speaking achievement; and generalization of listening comprehension to new material. The treatment groups are represented in the tables as follows: *Group Sp*, massed pretraining, speaking first; *Group LC*, massed pretraining, listening comprehension first; *Group Sp/LC*, concurrent training, brief periods of speaking first; *Group LC/Sp*, concurrent training, brief periods of listening comprehension first. The mean mental ages in months for each of the treatment groups were: *Group Sp*, 95.41; *Group LC*, 94.37; *Group Sp/LC*, 99.37; *Group LC/Sp*, 98.70.

Since the means of the treatment groups differed, and since a substantial correlation (discussed below) was noted between the subjects' achievement test scores and their mental ages, the means for the treatment groups were adjusted for mental age as shown in Tables 1 and 2.

Table 3 presents the intercorrelations among the subjects' mental ages in months and their scores on the four posttests. The correlation of .92 in Table 3 between scores on the Listening Comprehension Test and the scores achieved on this same test when it was administered two weeks later in order to assess retention of listening comprehension indicates that the retest reliability of the test was highly satisfactory.

Correlations of approximately .5 may be noted in Table 3 between mental age and each of the four posttest scores. These substantial correlations suggested mental age as a covariate to add statistical precision to the analysis of the findings. Consequently, analysis of covariance was used to analyze the findings presented in Tables 1 and 2. These analyses are summarized in Table 4. The dimensions of the experimental design are represented by Sequence, i.e., speaking training first or listening comprehension training first, and Massed-Concurrent representing massed pretraining in speaking or listening comprehension or concurrent training in the two skills.

Table 1

Means, Standard Deviations, and Means of Treatment Groups Adjusted for Mental Age, on Tests of Listening Comprehension and Retention of Listening Comprehension

Listening Comprehension

Treatments	Mean	Standard Deviation	Adjusted Mean
Group Sp	44.85	13.78	45.73
Group LC	34.78	16.28	36.25
Group Sp/LC	42.30	13.48	41.03
Group LC/Sp	40.78	16.44	39.78

Retention of Listening Comprehension

Treatments	Mean	Standard Deviation	Adjusted Mean
Group Sp	48.48	12.22	49.35
Group LC	35.19	16.97	36.64
Group Sp/LC	45.22	12.30	43.87
Group LC/Sp	40.82	16.62	39.85

Table 2

Means, Standard Deviations, and Means of Treatment Groups Adjusted for Mental Age, on Tests of Speaking Achievement and on Test of Generalization to New Material

Speaking Achievement

Treatments	Mean	Standard Deviation	Adjusted Mean
Group Sp	148.15	79.34	152.75
Group LC	131.56	76.35	138.79
Group Sp/LC	121.04	83.31	114.32
Group LC/Sp	142.33	59.64	137.47

Generalization to New Material

Treatments	Mean	Standard Deviation	Adjusted Mean
Group Sp	44.70	15.94	45.63
Group LC	38.15	15.54	39.70
Group Sp/LC	44.04	13.91	42.59
Group LC/Sp	44.33	14.31	43.29

Table 3

Intercorrelations Among Mental Age and Achievement Test Scores Based on Scores of 108 Primary School Children

	Mental Age	LC	Ret	Sp
Listening Comprehension (LC)	.51			
Retention of Listening Comprehension (Ret)	.51	.92		
Speaking (Sp)	.49	.76	.74	
Generalization	.56	.69	.70	.74

For the Listening Comprehension Test, the difference was statistically significant between the means of the two groups which received speaking training first and the means of the two groups which received listening comprehension training first. The difference favors the groups which had speaking training first, suggesting that the speaking-first treatments were more effective in producing skill of listening comprehension.

Results on the Retention Test of Listening Comprehension given two weeks after the program of instruction show a significant difference between the means of the two groups which received speaking training first and the means of the two groups which received listening comprehension training first. This difference again favors the groups which received speaking training first, suggesting that the groups receiving speaking training first retained the skill of listening comprehension better than those groups which received listening comprehension training first. Comparing the adjusted means for the treatment groups presented in Table 1 on the Listening Comprehension Test and on the Retention Test, it may be noted that the differences among the treatment groups are more clear in the Retention Test data. This is reflected in the analysis of the scores presented in Table 4 by the F ratio for sequence on the Retention Test.

No significant differences were obtained for the treatment groups

Table 4

Analysis of Covariance for Achievement Test Scores for Groups Receiving Different Sequences of Training (Seq) and Massed-Concurrent Training (MC)

Test	Source	df	MS	F
Listening Comprehension	Seq	1	760.86	4.56*
	MC	1	10.82	< 1
	Seq x MC	1	470.00	2.82
	Error	103	166.93	
Retention	Seq	1	1891.83	11.95**
	MC	1	34.15	< 1
	Seq x MC	1	508.71	3.21
	Error	103	158.37	
Speaking	Seq	1	603.31	2.44
	MC	1	10283.62	< 1
	Seq x MC	1	9168.00	2.17
	Error	103	4220.76	
Generalization	Seq	1	184.85	1.18
	MC	1	1.88	< 1
	Seq x MC	1	296.64	1.89
	Error	103	156.63	

*$p<.05$
**$p<.01$

on the Speaking Test. However, this was not because the test was unreliable, since the split-half reliability of the test was found to be .97. Differences may have been obscured by the unfamiliar testing conditions. Some subjects did well, responding to almost every item, but many subjects appeared unable to respond vocally in the "strange" individual testing situation, speaking into a microphone and receiving directions from the native French assistant. The novel test setting may have interfered considerably with performance on the speaking test.

There were no statistically significant differences among the treatment groups on the Generalization Test. It may be noted from Table 2, however, that the adjusted means for the treatment groups are in the same order as the means for the two administrations of the Listening Comprehension Test presented in Table 1, and that the standard deviations for the two tests are comparable. It may be noted further that the over-all mean of the four treatment groups on the Generalization Test is 43 of a possible 78 items, while a "chance score" would be approximately 26 items correct with three alternatives for each item. This evidence of substantial generalization to new vocabulary and new grammatical response patterns suggests that the type of instructional program used in the experiment may be useful for this purpose.

Summarizing the results of the experiment, the sequences of instruction in French which provided speaking training first produced superior performance on the Listening Comprehension Test to sequences which provided listening comprehension training first. This was true when the test of listening comprehension was administered immediately following instruction; the effect was more clear when the Listening Comprehension Test was administered two weeks later in order to measure retention of listening comprehension. The results for the effect of sequence of training on the skills of speaking and on generalization to new material were inconclusive.

Postponement of discussion. The rationale and interpretation of Experiment I are treated in Chapters IV and V following the presentation of an experiment in Chapter III which is closely related.

CHAPTER III

RESPONSE DIFFERENTIATION AND STIMULUS DISCRIMINATION IN LEARNING FRENCH VOCABULARY

The Vocabulary Item

It might be argued that an item of vocabulary has been well learned when a student makes necessary speaking, writing, and "identification" responses, and when these responses have been brought under the control of appropriate stimuli for that item. This learning can be brought about through response differentiation and stimulus discrimination. The procedure will be illustrated for any given vocabulary item by the following paradigm:

S_1 subject sees picture	R_1 subject selects picture
S_2 subject hears word	R_2 subject says word
S_3 subject sees word written	R_3 subject writes word

One method of teaching the responses necessary for learning a vocabulary item is to present the student with a model stimulus and to reinforce the student when a response he makes has a formal correspondence to this model. Thus, referring to the paradigm, a student might be taught to identify a picture he sees by selecting a similar picture from among alternatives (S_1R_1).[1] A speaking response might be acquired "echoically," i.e., the student echoes a word he hears and is reinforced if his utterance sounds similar to the model utterance (S_2R_2). The student learns the response of writing a word if he copies the word and is reinforced when the word he writes appears similar to the model (S_3R_3). The differentiation of responses for a vocabulary item generally requires shaping of the student's responses to the specified forms. To accomplish this, reinforcement may first be given when there is only a gross correspondence between the model stimulus and the form of the student's response; as shaping continues reinforcement is withheld unless the correspondence becomes closer. Continuing this procedure, each of the responses for the vocabulary item is brought under the control of its model stimulus so that a response of the required form occurs readily when the model is presented.

But, for adequate learning of a vocabulary item, each of the responses for the item must be brought under the control of appropriate stimuli other than the model stimulus. Referring again to the paradigm, the student must learn six other S-R tasks: he must learn to select an appropriate picture when he hears a word (S_2R_1), and to select this picture when he sees the word written (S_3R_1); he must learn to say the word when he sees the picture (S_1R_2), and to say the word when he sees the written word (S_3R_2); finally, he must learn to write the word when he sees the picture (S_3R_1), and to write the word when he hears the word (S_2R_3). The student is reinforced for *how* to make a response as he learns to make the responses for a vocabulary item; in the last six S-R tasks the student is reinforced for *when* to make a response. For example, the student must learn to say a particular word only when an appropriate picture is presented, and never when other pictures are presented (S_1R_2). The other remaining S-R tasks require analogous reinforcing conditions.

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[1] Differentiation of this S_1R_1 identification response is a vocabulary learning task to the extent that it is requisite to other vocabulary skills which would be influenced if the response were not acquired. It does not represent a language skill in any other sense.

Classification of discrimination learning tasks. In all, nine discriminations or S-R learning tasks may be suggested as a basis for adequately learning a vocabulary item.[1] Three of these discriminations are learned as a student's responses are shaped so that they correspond formally to model stimuli. Since these discriminations are learned concomitantly with response "forms," they will be called formal discriminations. They are the following: matching to sample (S_1R_1); echoic responding (S_2R_2); and, transcription (S_3R_3). The six remaining discriminations involve other vocabulary skills: listening comprehension (S_2R_1); reading comprehension (S_3R_1); speaking or tacting (S_1R_2); texting (S_3R_2); writing (S_1R_3); and, dictation (S_2R_3). It will be noticed that the six S-R tasks which operationally define these last six vocabulary skills do not require correspondence of form between stimulus and response terms. Rather, they are cross-discriminations among the stimuli and responses for a vocabulary item. This distinction between formal and cross-discriminations is important for understanding the rationale of the experiment presented in the next chapter.

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[1] Several descriptive labels for these learning tasks have been adapted from Skinner, 1957.

Response differentiation in learning vocabulary discriminations. It will be noticed that the differentiation of new language responses is particularly important in establishing a formal discrimination for a vocabulary item; reinforcement is made contingent upon the extent to which a response produces a stimulus which resembles a model stimulus. For example, a student hears a model word and attempts to pronounce it. He is reinforced if his pronunciation response produces a pattern of sound which closely resembles the word he has heard. Response differentiation also occurs as cross-discriminations are established for a vocabulary item; it is still necessary that the student produce a response of identifiable form in order to receive reinforcement. However in establishing a cross-discrimination, control of the vocabulary response by stimuli other than the model stimulus is the principal concern. The student must "say the correct word," but also, this response must be given in the presence of appropriate stimuli such as a particular picture or a particular printed word. Thus, in establishing formal discriminations for vocabulary items the differentiation of new responses is focused upon, while in establishing cross-discriminations the emphasis is on the control of differentiated responses by appropriate stimuli other than model stimuli.

Facility of Learning Two French Vocabulary Skills as a Function of Pretraining in Related Skills

Problem. An experiment (Experiment II) was designed to study the relationship between pretraining in vocabulary skills and the ease or efficiency of learning other related skills. Nine distinct discrimination learning tasks have been suggested as the basis for learning a vocabulary item, three formal discriminations and six cross-discriminations. The general question to be answered by the experiment was whether pretraining in some of these discriminations would facilitate learning the remaining ones. More specifically, the problem was whether the number of cross-discriminations for a French vocabulary item established by pretraining could be related functionally to the facility of learning particular novel cross-discriminations for that item. In the experiment, five groups of subjects learned three French vocabulary items. Each group first received equal training in the three formal discriminations for the items, then training in a different number of cross-discriminations for the items. The experiment explored the possibility of a functional relationship between this pretraining and the facility with which the subjects learned novel cross-discriminations for the items.

Subjects. The subjects were 100 third grade children from two elementary schools, School A and School B, in Los Angeles, California. School A is located in a middle-class socio-economic neighborhood; 40 subjects from School A had a mean intelligence index of 111.90 with a standard deviation of 10.29 points. School B is located in a lower middle-class socio-economic neighborhood; 60 subjects from School B had a mean intelligence index of 106.88 with a standard deviation of 10.28 points.

Design. The subjects at each of the two schools were separated into two levels of ability, high and low, on the basis of intelligence index and reading grade placement scores; the subjects at each ability level were assigned randomly to five treatment groups. Thus at each school there were five treatment groups of low ability subjects, and five groups of high ability subjects. There were four subjects in each of the 10 groups at School A, and six subjects in each of the 10 groups at School B. Two schools, two ability levels and five treatment groups provided a three-way factorial design for the experiment, as shown in Figure 6.

Equipment. The subjects in each group sat at tables separated from one another by plywood partitions. They listened to tape recorded material through earphones and watched visual presentations projected on a screen. Stimuli were presented from a Wollensak tape recorder synchronized with a 35 mm. Kodak Carousel slide projector by means of a Kodak Cavalcade programmer.

Procedure. The experiment was conducted as follows: (A) equal preliminary training in the three formal discriminations for each of the vocabulary items for all treatment groups; (B) systematic variation for the five treatment groups in number of cross-discriminations established by training, with control so that all groups received equal response practice and stimulus exposure to the materials; and (C) two novel cross-discriminations taught as test-tasks.

Three spoken French words, le garçon, la fille, and le chien with their printed forms and pictorial representations were used for three vocabulary items. For example, le garçon provided the following vocabulary item:

Treatment Groups

School A

		I	II	III	IV	V
Ability	High	4	4	4	4	4
	Low	4	4	4	4	4

School B

		I	II	III	IV	V
Ability	High	6	6	6	6	6
	Low	6	6	6	6	6

Figure 6

Ability Level and Number of Subjects
in Treatment Groups of
Experiment II

S_1 subject sees picture of boy	R_1 points to picture of boy
S_2 subject hears *le garcon*	R_2 pronounces *le garcon*
S_3 subject sees *le garcon* written	R_3 writes *le garcon*

First, *all* subjects received equal training in the formal discriminations necessary for the three French vocabulary items. The subjects learned to select a picture corresponding to one projected on the screen (S_1R_2), they learned to pronounce a word when they heard it through earphones (S_2R_2), and they learned to print a word when they saw it projected on the screen (S_3R_3). (The training program for the formal discriminations is presented in Appendix B, p. 189.)

Next, the number of cross-discriminations established by training was varied systematically for the five treatment groups who were taught 0, 1, 2, 3, and 4 cross-discriminations respectively. A cross-discrimination was taught by presenting a stimulus term and reinforcing the correct responses of the subjects by confirmation. For example, in learning the S_3R_2 cross-discrimination, the subjects saw the word *le garçon* projected on the screen. They responded by saying *le garçon*. Then this response was confirmed as the subjects heard *le garçon* through earphones. This procedure was repeated for the other printed words (*la fille* and *le chien*) until the subjects had learned to make the correct utterance when each of the words was presented. (The cross-discrimination training is presented in Appendix B,p. 192.)

The particular vocabulary discriminations established for each of the five treatment groups is summarized in Figure 7. All subjects received equal training in the three formal discriminations for each vocabulary item, then training in an additional number of cross-discriminations for each item as shown in Figure 7.

Control was exercised so that total stimulus exposure and response practice was equivalent for the five treatment groups. This was done by giving the groups differing amounts of compensating exposure and practice on the formal discriminations. Referring to Figure 7, Group I received additional training which brought its total stimulus exposure and response practice up to the level of that received by Group V; Group II received less additional exposure and practice, since it was trained on the S_1R_2 cross-discrimination; Group III received still less compensating exposure and practice, and so on to Group V which received no exposure and practice in addition to the training listed in Figure 7. In this way, the subjects in each of the five treatment groups received the same number of stimulus presentations and made the same number of responses, but each group received training on a different number of cross-discriminations. (The additional stimulus exposure and response practice given each of the treatment groups is presented in Appendix B, p.118.)

Two of the cross-discriminations for each of the vocabulary

Group I	Group II	Group III	Group IV	Group V
S_1R_1	S_1R_1	S_1R_1	S_1R_1	S_1R_1
S_2R_2	S_2R_2	S_2R_2	S_2R_2	S_2R_2
S_3R_3	S_3R_3	S_3R_3	S_3R_3	S_3R_3
	S_1R_2	S_1R_2	S_1R_2	S_1R_2
		S_2R_3	S_2R_3	S_2R_3
			S_3R_2	S_3R_2
				S_3R_1

Figure 7

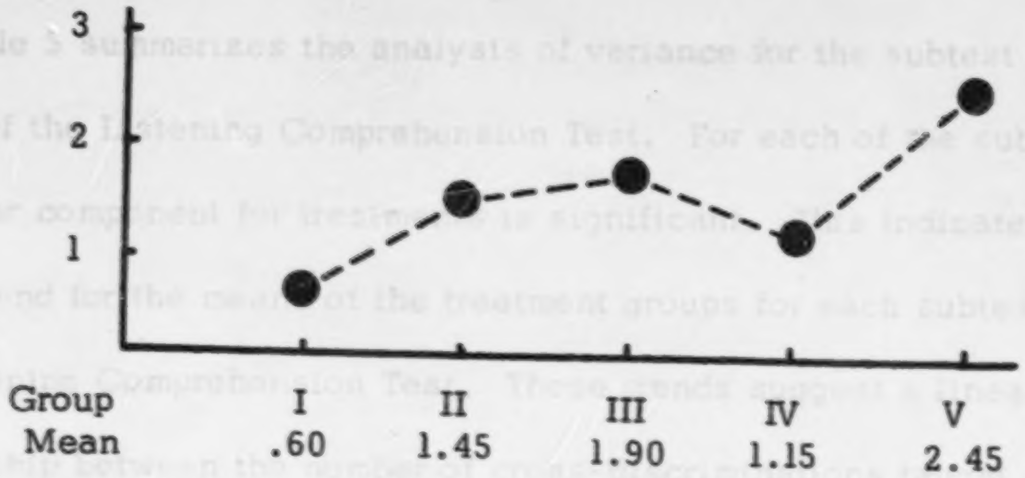
Vocabulary Discriminations Established
for Five Treatment Groups
in Experiment II

items were not taught during training for any of the five treatment groups. These remaining cross-discriminations were learned by all subjects as test-tasks. The two tests were Listening Comprehension (S_2R_1), and Writing (S_1R_3).

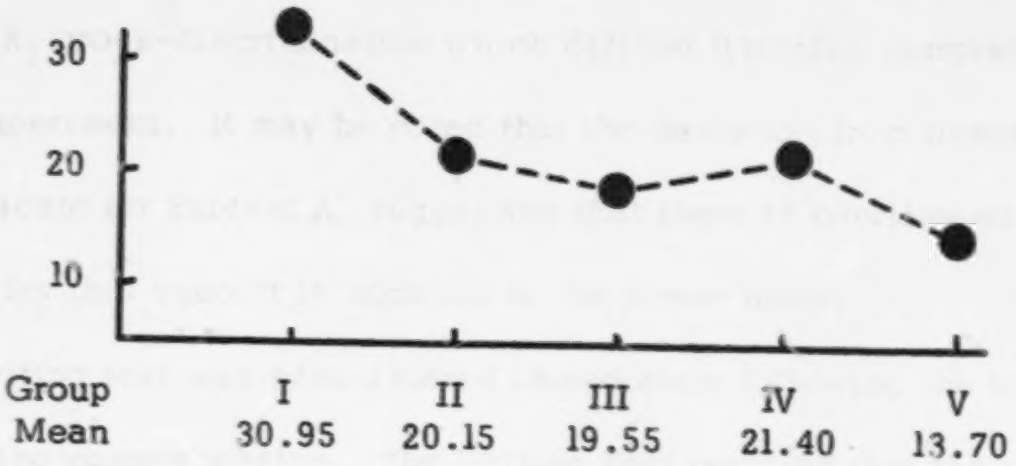
Results. The Listening Comprehension Test required that the subjects learn to select an appropriate picture when they heard each of the words le garçon, la fille, and le chien. Each subject received a booklet containing 45 pages; on each page there were three pictures: a girl, a boy, and a dog. The subjects were instructed to mark the picture corresponding to a French word they heard through their earphones. Figure 8 presents the means for the five treatment groups on three subtests of the Listening Comprehension Test. There was no confirmation for the first three items of the test; Subscore A was the score assigned to each subject for the number of these unconfirmed items he answered correctly. Confirmation did occur after each of the remaining 43 items on the test; for each of these items, after hearing a word and marking one of the three alternative pictures, the subjects were told which picture should have been marked. Subscore B was assigned for each subject as the number of confirmed items necessary to a criterion of nine consecutive items without an error. This score was taken to represent "mastery" of the task. Subscore C was assigned to each subject as the total number of pictures marked correctly of

L

Subscore A: First Three Unconfirmed Items



Subscore B: Items to Criterion of Nine Successive Items Correct



Subscore C: Total Number of 45 Possible Items Correct

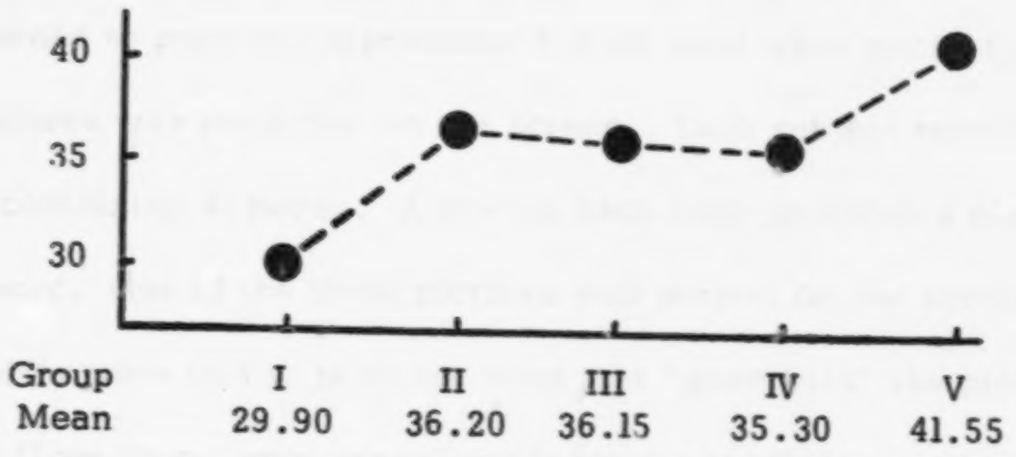


Figure 8 Means of Five Treatment Groups on Test of Listening Comprehension S_2R_1 (N=108)

a possible 45 items on the entire test.

Table 5 summarizes the analysis of variance for the subtest scores of the Listening Comprehension Test. For each of the subtests, the linear component for treatments is significant. This indicates a linear trend for the means of the treatment groups for each subtest of the Listening Comprehension Test. These trends suggest a linear relationship between the number of cross-discriminations taught during each treatment and the facility with which the subjects learned the novel S_2R_1 cross-discrimination which defined listening comprehension in the experiment. It may be noted that the deviation from linearity is significant for Subtest A, suggesting that there is curvilinearity to the data for this subtest in addition to the linear trend.

A writing test was administered immediately following the test of listening comprehension. The Writing Test required that the subjects learn the single remaining cross-discrimination S_1R_3; the subjects learned to print the appropriate French word when each of the three pictures was projected on the screen. Each subject received a booklet containing 41 pages. A line on each page provided a place to print a word. One of the three pictures was project on the screen, and the subjects were told to print the word that "goes with" the picture. The first three items were unconfirmed; for the remaining 38 items, confirmation was provided by projecting the correct printed word on the

Table 5

Analysis of Variance of Listening Comprehension Test Scores

	Source	df	MS	F
Subscore A: First Three Unconfirmed Items	School (S)	1	1.26	< 1
	Ability (A)	1	.36	< 1
	Treatments (T)			
	linear	1	23.12	18.35**
	non-linear	3	4.54	3.60*
	S x A	1	.003	< 1
	S x T	4	.67	< 1
	A x T	4	.29	< 1
	S x A x T	4	.51	< 1
	Error	80	1.26	
Subscore B: Items to Criterion of Nine Consecutive Items Correct	School (S)	1	51.34	< 1
	Ability (A)	1	297.04	1.97
	Treatments (T)			
	linear	1	2211.11	14.73**
	non-linear	3	248.22	1.65
	S x A	1	170.35	1.14
	S x T	4	143.52	< 1
	A x T	4	157.10	1.05
	S x A x T	4	147.31	< 1
	Error	80	150.07	
Subscore C: Total Number of 45 Possible Items Correct	School (S)	1	4.73	< 1
	Ability (A)	1	223.30	2.97
	Treatments (T)			
	linear	1	1003.52	13.35**
	non-linear	3	60.97	< 1
	S x A	1	26.87	< 1
	S x T	4	113.57	1.51
	A x T	4	96.98	1.29
	S x A x T	4	37.53	< 1
	Error	80	75.16	

*$p < .05$

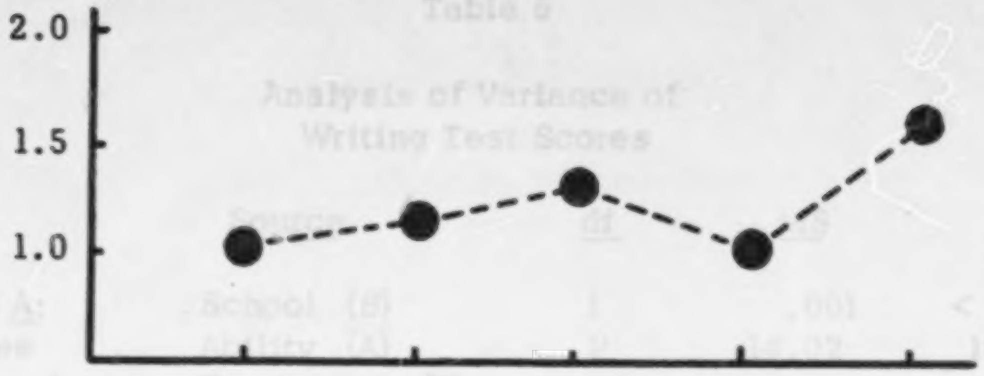
**$p < .01$

screen after allowing the subjects an interval of time to respond. An item was correct only if the subject printed a complete correct word with its proper article. The scoring of the Writing Test was analogous to that of the Listening Comprehension Test; each subject was assigned three scores: Subscore A, number of items correct on the first three unconfirmed items; Subscore B, number of items to a criterion of nine consecutive items correct; and Subscore C, total number correct of a possible 41 items. The means for the subscores for each of the five treatment groups on the Writing Test are presented in Figure 9.

An analysis of variance for each of the three subscores on the Writing Test is presented in Table 6. No significant trend to the means of the treatment groups for any subscore was detected by the analysis. It may be noted that the differences between the ability levels for the Writing Test scores is statistically significant for all three subscores, suggesting that skills assessed by the Writing Test are associated with the ability groupings.

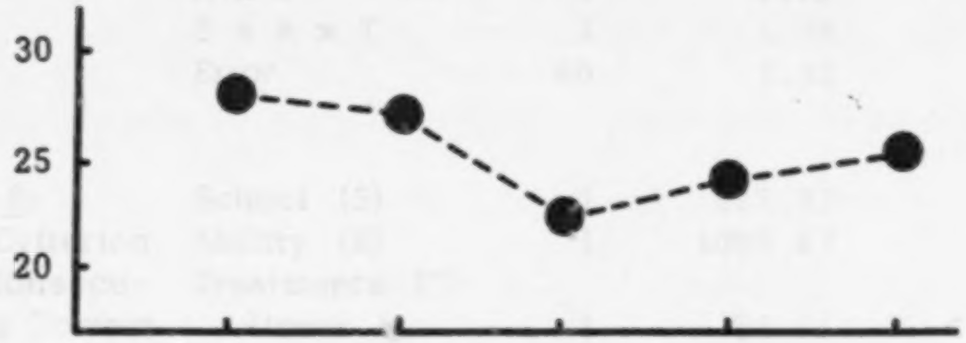
During the administration of the Writing Test, great variability was noted in the speed and legibility with which the subjects were able to print a required word. Some subjects printed very rapidly and legibly, while many others seldom finished in the available time, or else their printing responses were ambiguous and their attempt consequently was scored as incorrect. It is not clear what effect this problem had on the results for the Writing Test.

Subscore A: First Three Unconfirmed Items



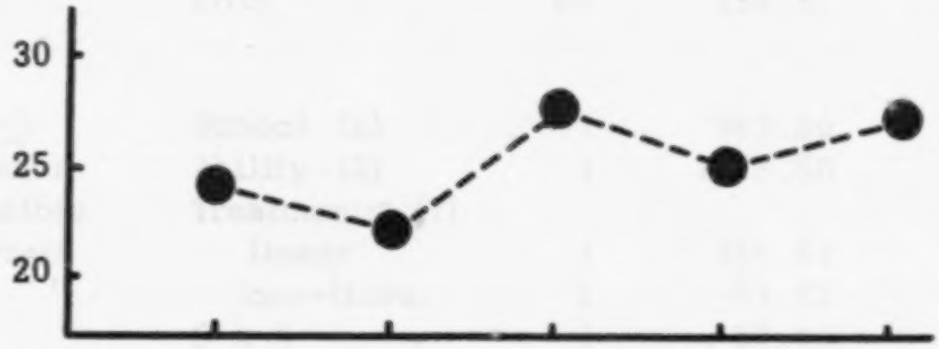
Group	I	II	III	IV	V
Mean	1.15	1.25	1.40	1.14	1.70

Subscore B: Items to Criterion of Nine Successive Items Correct



Group	I	II	III	IV	V
Mean	27.95	27.15	22.75	24.30	26.15

Subscore C: Total Number of 45 Possible Items Correct



Group	I	II	III	IV	V
Mean	24.60	22.55	28.90	25.20	28.10

Figure 9 Means of Five Treatment Groups
on Writing Test S_1R_3 (N=108)

Table 6

Analysis of Variance of
Writing Test Scores

	Source	df	MS	F
Subscore A: First Three Unconfirmed Items	School (S)	1	.001	< 1
	Ability (A)	1	14.02	10.62**
	Treatments (T)			
	linear	1	1.81	1.37
	non-linear	3	1.68	1.27
	S x A	1	3.55	2.69
	S x T	4	2.57	1.95
	A x T	4	2.13	1.61
	S x A x T	4	1.48	1.12
	Error	80	1.32	
Subscore B: Items to Criterion of Nine Consecutive Items Correct	School (S)	1	325.97	2.33
	Ability (A)	1	1098.67	7.85**
	Treatments (T)			
	linear	1	83.21	< 1
	non-linear	3	64.46	< 1
	S x A	1	173.23	1.24
	S x T	4	213.41	1.53
	A x T	4	158.35	1.13
	S x A x T	4	154.80	1.11
	Error	80	139.91	
Subscore C: Total Number of 45 Possible Items Correct	School (S)	1	363.60	2.50
	Ability (A)	1	1358.50	9.35**
	Treatments (T)			
	linear	1	186.62	1.28
	non-linear	3	87.82	< 1
	S x A	1	57.42	< 1
	S x T	4	43.53	< 1
	A x T	4	241.44	1.66
	S x A x T	4	194.51	1.33
	Error	80	145.23	

$^{**}p < .01$

CHAPTER IV

RATIONALE OF THE EXPERIMENTS

The Meaning of "Discrimination"

Two experiments have been presented which explore the way in which response differentiation and stimulus discrimination enter into language learning. The rationale behind these experiments was suggested by a series of experiments (Pimsleur, Mace, and Keislar, 1961) which attempted to study the effect of preliminary discrimination training upon the subsequent learning of French pronunciation responses. It was reasoned that if a student first learned to recognize fine phonemic differences between speech sounds spoken by native French speakers, he would then be able to profit more from pronunciation training; as a better judge of pronunciation he would be able to compare his own attempts with those of a model, receiving reinforcing "feedback" when his attempts compared favorably. In the course of the experiments it became apparent that the subjects tested could perform the type of discrimination which was necessary for learning pronunciation of speech phonemes with little or no training. Their skill at detecting fine nuances of difference among aural stimuli was much better than had been expected.

The skill of subjects in distinguishing small acoustic differences between stimuli led to a clarification and extension of the term "discrimination." The term had been made synonymous with "discriminability" and referred to the specific discrimination task of reporting when two stimuli were "the same or different." A broader *operant* definition of the term *stimulus discrimination*[1] was adopted which allowed dealing with other language tasks. According to this definition a *discrimination* occurs to the extent that a well differentiated response is emitted consistently in the presence of a particular *discriminative stimulus* (S^D), and is *not* emitted in the presence of other stimuli (S^{Δ}'s).

The operant meaning of discrimination suggested a change in the learning task required during preliminary discrimination training among phonemes. Speech sounds spoken by native French speakers were still used as stimuli, but rather than reporting "same" or "different" as before when two sounds were presented, each speech sound was made an S^D for the response of selecting a particular spelling from among printed words. Thus, acoustical differences between the stimuli were still the basis for discrimination, but the training now required a particular identifiable response to each of the stimuli rather than an indication of whether the difference between any two stimuli was beyond the subject's "difference threshold."

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[1] A lucid discussion of operant stimulus discrimination is presented in Keller and Schoenfeld, 1950, Chapter V. The standard operant notation adopted here is introduced on p. 118.

A problem had been encountered when attempts were made to test French pronunciation responses: how could these responses be evoked without allowing the subjects to mimic a French model? The problem was handled now by using printed words to evoke the pronunciation responses. In a test of pronunciation, a printed word was an S^D for emitting a particular pronunciation response, while other printed words became S^{Δ}'s for this response.

Using these methods of training and testing, an experiment was carried out to investigate the effect of preliminary discrimination training among three French phonemes on subsequent pronunciation of these phonemes. This experiment will be summarized in some detail in order to elucidate the rationale of the present experiments.

The French Phoneme Experiment

High school students first received discrimination training among the three phonemes, the nasal vowels /õ/ , /ɛ̃/ , /ã/ . They learned to circle the correct printed form or words containing the phonemes (e.g., pont, pend, pain) when they heard the words pronounced. By this discrimination training, the three phonemes in the context of French words became aural S^D's which were occasions for the three differentiated responses of circling the appropriate spellings. A control group received equal exposure to the materials, but did not receive discrimination training. The subjects in this group saw the printed words as they heard the words pronounced, but were not trained to label the pronounced words with their printed forms.

Next, all subjects received the same training in pronunciation of the words. They heard a word pronounced by a native speaker and pronounced it themselves, recording both the pronunciation of the model and their own attempt. At frequent intervals they listened back and compared their pronunciations with those of the model.

Finally, all subjects received a pronunciation test in which written forms of the words were used as stimuli to occasion the pronunciation responses. The subjects pronounced the words as they read them from a list, recording their utterances for later scoring. The scoring was done by native French judges on the basis of comprehensibility. A judge had a multiple-choice type form before him with the three phonemes as alternatives for each utterance to be judged. A judge played a subject's recording and decided, for each utterance, which of the three phonemes the subject had pronounced and then marked his choice on the scoring form. Comparing this form with the list from which the subject had read, a subject's score was the number of items a judge was able to understand correctly.

The results of the experiment were unambiguous: subjects receiving preliminary discrimination training were clearly superior on the pronunciation test to subjects receiving only exposure without discrimination training. (The _F_ ratio was 23.75; df = 1, 194; p.< .01 for the difference between the means of the groups.)

Rationale of the Experiments

In the French Phoneme Experiment and in the present experiments, language learning tasks were classified by distinguishing between two types of language discriminations: formal discriminations, and cross-discriminations. (This distinction is presented in detail for the case of vocabulary learning in Chapter III.) In _formal discriminations_, the form of a response is such that it produces a stimulus having a close resemblance to the S^D. For example, a formal discrimination has been established when a subject readily emits an utterance which sounds very similar to one he has just heard (echoic responding). Response differentiation is particularly important in establishing formal discriminations; generally, reinforcement is made contingent on the correspondence of a stimulus produced by a response and an S^D which is its "model." _Cross-discriminations_ among language stimuli and responses are established as differentiated responses are brought under the control of S^D's other than model stimuli. For example, certain utterances come to be made in the presence of certain objects or events (speaking or "tacting"), and certain texts are written when certain utterances are heard (transcription). Other language skills require other cross-discriminations by which language responses are "hooked up" to stimuli in the language environment.

Discrimination learning in the three French language experiments. The present experiments and the French Phoneme Experiment suggest a common rationale for all three experiments in terms of the following discrimination learning paradigm:

S_1 subject sees picture	R_1 subject identifies picture
S_2 subject hears utterance	R_2 subject produces utterance
S_3 subject sees printed text	R_3 subject prints or identifies text

The Phoneme Experiment was concerned with the bottom four stimulus-response terms. During discrimination training, the subjects first learned the S_2R_3 cross-discrimination, circling printed forms of words when they heard the words pronounced. Then they received echoic training in the S_2R_2 formal discrimination, learning to pronounce the words when they heard them pronounced. Finally, they were tested on the S_3R_2 cross-discrimination, pronouncing the words when they saw their printed forms.

The first of the present experiments (Experiment I) studied optimal sequence of differentiation and discrimination training in French instruction. It was concerned with the top four stimulus-response terms in the discrimination learning paradigm. Half of the subjects in this experiment received speaking training first. This speaking training required learning the S_1R_2 cross-discrimination and the S_2R_2 formal discrimination; the subjects saw a picture and heard an utterance and were required to repeat the utterance, then they were required to produce the utterance when the picture alone was presented. Following speaking training, the speaking-first subjects received listening comprehension training which required learning the S_2R_1 cross-discrimination; they learned to select an appropriate picture when they heard an utterance. The other half of the subjects in the experiment were given the reverse of the above training sequence. First they were given the listening comprehension training, then the speaking training. All subjects were tested on both listening comprehension and speaking.

The second of the present Experiments (Experiment II) concerned all six stimulus-response terms in the paradigm. First, all subjects were taught the three formal discriminations, S_1R_1, S_2R_2, and S_3R_3. Then training in an additional number of cross-discriminations was systematically varied for five treatment groups, who received additional training in 0, 1, 2, 3, and 4 cross-discriminations respectively. All the subjects were tested on the facility with which they learned two remaining novel cross-discriminations, listening comprehension (S_2R_1) and writing (S_1R_3).

It may be noted that the three French language experiments involved discrimination skills at different "levels" of language complexity. The Phoneme Experiment established language discriminations at the phonemic level: speech sounds and their corresponding printed spellings (graphemes) were used as stimulus and response terms. In Experiment II, language discriminations were at the lexical level: stimuli and responses for vocabulary items were spoken words, printed words, and appropriate pictorial representations. Experiment I studied language at the syntactical level: the stimuli and responses were phrases and sentences and corresponding pictorial representations. A conceptual framework of language in terms of specific discrimination skills therefore has been applied at various levels of language analysis.

In general, then, the three French language experiments are part of the same line of investigation which has studied discrimination learning in closely related language skills at various levels of complexity. The present experiments fit well into a general conceptual framework which was first applied in the French Phoneme Experiment. Further thought about the phoneme experiment within this framework suggested the specific problems of the present experiments.

Sequence of differentiation and discrimination training. It may be noted that the sequence of training in the French Phoneme Experiment was cross-discrimination training first, then formal discrimination training which required the differentiation of new pronunciation responses; the subjects in the experiment first learned to circle the appropriate spellings when they heard words containing the three phonemes, then they learned to pronounce the words. Different sequences of training might have produced different effects in learning the phonemes. The subjects might have received first training emphasizing response differentiation; in this sequence the subjects would learn to pronounce the words before cross-discrimination training of learning to identify spellings when they heard the words. A third sequence would have been concurrent training in both formal discriminations and cross-discriminations requiring simultaneous training in both pronouncing the words and identifying them with their appropriate spellings. The final test required the cross-discrimination of pronouncing the words when the spellings were presented. Differences on this test would imply that one of the three sequences of training was more effective than another in teaching this skill.

The problem of sequence of formal discrimination and cross-discrimination training was focused upon in Experiment I. Rather than using speech sounds and their printed equivalents as in the French Phoneme Experiment, Experiment I used grammatical utterances (words, phrases, and sentences) and corresponding pictorial representations as stimulus and response terms. Choosing materials at this syntactic level of language learning allowed plausible operational definitions of "speaking" and "listening comprehension." Response differentiation was particularly important in the speaking training when the subjects learned the formal discriminations of pronouncing the utterances as they heard them. Cross-discriminations were more important during listening comprehension training when the subjects learned to select an appropriate picture as they heard an utterance. Within the limitations of the experiment, it was demonstrated that a sequence of speaking training first followed by listening comprehension training produced superior performance on tests of listening comprehension.

Experiment II went beyond Experiment I. It introduced differentiation of the textual responses of printing different French words. First, all subjects received the same differentiation training as they learned the formal discriminations S_1R_1, S_2R_2 and S_3R_3 for three French vocabulary items. Then training in an additional number of cross-discriminations was systematically varied for five treatment groups. Response learning was assumed to be minimal during additional cross-discrimination training, since all the subjects had been given liberal response training prior to this additional training. Summarizing the experiment in terms of sequence of training: first, vocabulary responses were differentiated; then, a relationship was demonstrated between training in an additional number of cross-discriminations and the facility of learning a novel cross-discrimination.

Number of cross-discriminations as a variable. In both the phoneme experiment and in Experiment II number of trained cross-discriminations was varied. The subjects in the Experimental Group of the phoneme experiment received preliminary training in the S_2R_3 cross-discrimination of identifying spellings when they heard words; the subjects in the Control Group did not receive this training. All subjects then received training in the S_2R_2 formal discrimination of pronouncing the words when they heard them. It might be assumed that all the subjects had approximately equal training from their prior English language background in the S_3R_3 formal discrimination of identifying printed words corresponding to printed words they saw. If this assumption is made, the experimental subjects had training in three discriminations, one cross-discrimination and two formal discriminations, while the control subjects had only training in the two formal discriminations. Training in the additional cross-discrimination accounted for the superior performance of the experimental subjects on the final test which required the remaining S_3R_2 cross-discrimination, pronouncing the words when the spellings were presented.

The number of cross-discriminations established in the phoneme experiment was none for the Control Group and one for the Experimental Group. In Experiment II the number of additional cross-discriminations beyond the three formal discriminations was systematically varied for five treatment groups who learned 0, 1, 2, 3, and 4 cross-discriminations respectively. Within the limitations of the experiment, facility of learning a novel cross-discrimination was found to be related to number of cross-discriminations established during training.

Capitulation

Thus far, the discussion of the experiments has been factual and historical. Empirical findings have been presented and the experiments have been related to one another conceptually. The manner in which both experiments were generated from the findings of the French Phoneme Experiment has been emphasized. Chapter V discusses and evaluates related research literature and presents interpretations of the two experiments. Chapter VI summarizes the study and considers its implications.

CHAPTER V

RELATED RESEARCH LITERATURE AND INTERPRETATION OF FINDINGS

The present purpose is to relate Experiments I and II to the work and thinking of others who have been interested in the interrelated roles of response differentiation and stimulus discrimination in language learning.

For this discussion, a selection has been made of research findings and literature which contribute directly to an understanding of the two experiments of this study. Two sources have been particularly helpful in this regard: one is Carroll's (1963) review of teaching foreign languages; the other is Lane's (1964) discussion of recent research in programmed learning of a second language.[1] Other references are from general sources.

Carroll's review organizes currently available research-obtained knowledge about foreign language learning and teaching around research issues and methods which he believes are meaningful and practicable. Some of his concluding comments (p. 1094) summarize his evaluation of available research and perhaps suggest the relevance of the present study.

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[1] Appreciation is expressed to Dr. Lane for making an early draft of this paper available to the writer.

> Educational research has contributed very little to foreign language teaching methodology...Psychologists who have tried to investigate elements in the foreign language teaching process have frequently failed to produce useful results because their experimental settings and materials have not been sufficiently similar to those of the actual teaching situation as it occurs in the classroom or in the language laboratory. At the same time, research undertaken by foreign language teachers has only rarely been adequate with respect to research methodology.

Lane also stresses (p. 5) that "prior research on second-language learning has, with few exceptions, been seriously inadequate." He examines available research in programmed learning of a second language within the framework of a functional analysis of verbal behavior proposed by Skinner (1957). The interrelated problems of stimulus discrimination and response differentiation are central to Lane's discussion.

Overview of Chapter V. Discussion here of related research literature and interpretation of findings is divided into two parts. The first part is devoted to Experiment I on sequence of training. Two meanings of "discrimination" are contrasted, since relevant research and discussion about sequence of training has been done within a frame of reference which is somewhat different from that of the present experiments. Then, the basis in research for various sequences of training are discussed. Finally, three possible interpretations of the sequence finding of Experiment I are offered in light of available research and the facts of the experiment. These interpretations are presented under the titles of (1) Labeling, (2) Reversibility, and (3) Recency of Training. The second part of the chapter is devoted to Experiment II on learning vocabulary skills. Experiment II is summarized and its findings are related to those of Experiment I. An interpretation of Experiment II in terms of "context" is presented with supporting research.

Experiment I

Sequence of Training

The problem of Experiment I (presented in Chapter II) was the optimal sequence of two types of training, speaking and listening comprehension. Speaking training emphasized the differentiation of French utterances as responses. During listening comprehension training subjects learned to select an appropriate picture from alternatives when they heard a French utterance.

Two meanings of discrimination. Listening comprehension training in Experiment I was in accord with an operant definition of stimulus discrimination requiring that appropriate observable responses be emitted consistently in the presence of particular aurally presented speech-sound patterns. This operant meaning of discrimination may be contrasted with the usage of the term discrimination among many workers interested in language learning who think of discrimination as "hearing" different speech sounds or "distinguishing" among patterns of sound. One general purpose of the present study is to clarify the role of stimulus discrimination in language learning. The purpose here is to bring the two meanings of the term discrimination into sharp focus.

The labels operant and perceptual will be used to keep the two meanings of discrimination separate for discussion. Operant discrimination is generic and refers to specifiable control of stimuli over publicly identifiable responses. Perceptual discrimination refers to a special case when an individual's report is the only available evidence that discrimination has occurred. The epitome of this usage is a situation in which an individual "hears" two sounds and is asked, "Are they the same or different?" A perceptual discrimination occurs if, when the two acoustic stimuli actually are different, the individual reliably reports this difference by saying "different" or by indicating a correct judgment through some other observable response (e.g., pressing a particular button).

"Hearing" sounds and sound patterns is the central notion in the perceptual meaning of discrimination. Skinner (1953, p. 272) attempts to deal with such private events as "hearing" sounds and "seeing" objects as discriminative responses. He argues that "seeing" an object may occur when the object is presented. Later the object may be "seen" when ambiguous stimuli resembling the original object are presented, and also, under proper conditions, even when appropriate external stimuli are absent. A discriminative "hearing" response would be analogous.

This perceptual meaning of discrimination corresponds to the usage of the term discrimination which is implied, either implicitly or explicitly, in a body of research on speech perception, phonology, and language teaching. Certain of this research is useful in understanding the findings of the present study (e.g., Liberman, 1957) and, more generally, for understanding the role of discrimination in language learning. On the other hand, a perceptual view of discrimination has the drawback that a private event such as "hearing" a sound pattern is not open to public identification and direct empirical study. Such an event is thereby limited as a scientific datum. A further drawback to the perceptual point of view is that the label perceptual tends to imply a "perceiver." Such "subjective" formulations have important disadvantages (Skinner, 1953, Chapter III). One reason the term perceptual discrimination has been chosen for discussion here is to call attention to these problems involved in a widely used perceptual meaning of discrimination. Investigators of language learning who use this meaning may be looking at language differently than others who prefer a more empirical approach. This difference in point of view should be taken into account.

Sequence in learning second-language phonology. The phonology of a language includes the discrimination and the production of speech sounds and speech sound patterns. According to Carroll (1963, p. 1069), in order to master the phonology of a new language, the student must learn at least four skills: to discriminate by "hearing the difference" among the phonemes of the language; to articulate by making vocal motor movements which will produce the phonemes; to integrate the phonemes into smooth patterns for connected discourse; and finally, to make these patterns automatic so that they occur readily without noticeable effort or hesitation.

The question of optimal sequence for teaching the phonological skills of discrimination and sound production appears to be relatively unexplored and unanswered by available research. However, a widespread practice in language programming is to provide perceptual discrimination training among speech sounds first before sound production training. This practice stems from the "audio-lingual" or "aural-oral" conception of language teaching: the learner "...should hear much more than he speaks; he should speak only on the basis of what he has heard..." (Brooks, 1959, p. 50). Sapon (1961) teaches discrimination first in his elementary Spanish program. He writes: "In evaluating any program, one must remember that an individual can say only what he can hear, and one of the great strengths of this program is its training in auditory discrimination" (cited by Lane, 1964, p. 35).

Morton (1960) also stresses the importance of discrimination training first in his audio-lingual Spanish program. He first teaches what he calls phonematization:

> Essentially, this would hold that the incipient language learner learns first to "hear" and discriminate between all "significant" classes of sounds in the new language before a conscious effort is made to reproduce them; or, indeed, before any real capacity exists for reproducing them. It is an aural conditioning necessary to set up the "phonemic areas" which will work finally in his acoustico-neurological system like a series of narrow-band filters, passing appropriate sounds, rejecting others automatically... (cited by Lane, 1964, p. 36).

Carroll (1963, p. 1070) points up the lack of agreement among writers on the priority of either discrimination among sounds or sound production. After emphasizing the lack of empirical evidence in this regard he continues:

> Speculation among linguists seems to run to an almost schizoid indecision as to which of two diametrically opposed theories to accept: (1) that there is an automatic capacity to form the correct modes of sound production simply by careful and repeated listening--as if the learner is already "wired" to pronounce sounds correctly if he will only give full rein to this automatic capacity, or (2)...that the learning of a foreign phoneme occurs as a result of conscious attention to the articulatory process involved in its production...

The priority of training in discrimination among phoneme patterns. The practice of providing perceptual discrimination training first in second-language programs is based upon two plausible but unproven assumptions. In echoic training a student hears an utterance and attempts to reproduce the sound pattern he hears. It is assumed first that the student's pronunciation attempt will be confirmed and thereby reinforced if he can distinguish when the sound he produces is similar to that he hears. It is assumed also that training in distinguishing when two external acoustic stimuli are similar will "transfer" to the case in echoic training when one of the stimuli is external and the other is produced by the student's own vocal apparatus. It follows from these assumptions that the student should first receive discrimination training by learning to distinguish among external speech sounds so that this training will facilitate learning to produce the sounds. Lane (1964, p. 28) comments:

> This widespread practice is more a pious hope than a solution... There is little experimental evidence to suggest that the relevant discriminations, once conditioned, are effective in self-shaping echoic behavior. Furthermore, few of the programs that adopt this strategy provide for maintenance of the initial discriminations during self-shaping behavior.

Lane points out that the external confirmation stimulus and stimulation from the student's echoic response come to the student via different modalities: the confirmation stimulus is aural, while the response-produced stimulus comes through sidetone and bone conduction. This prompts Lane to suggest (p. 28) that "psychological differences in the perception of external versus 'autophonic' sounds probably impede the development of accurate echoic behavior."

Of course, the practice of first providing perceptual discrimination training among sounds implies the assumption that the student requires this training. However, some evidence already has been discussed (v.a., p. 54) which suggests that students often may be able to distinguish quite well among the sounds of a new language with little or no training (Pimsleur, Mace, and Keislar, 1961). Probably this is due to acoustic discrimination skill the student acquires in connection with his native language. Other investigators also have noted extremely rapid discrimination learning among speech sounds. Lane (1961) used Spanish phonemes as S^{D}'s and English approximations to these phonemes as S^{Δ}s, and reported that errors were quickly eliminated. He concludes:

> These data and others suggest that discrimination learning among the sounds of a second language, at least one within the same family as the subject's native language, may be expected to procede quite rapidly when conditions are optimized.

While it appears, therefore, that most second-language students are skillful already in distinguishing when two aurally presented speech sounds are similar or different, it may be that these students lack skill in distinguishing among longer patterns of sounds in the new language, i.e., "hearing" phrases and sentences. No research was located on this question.

Summarizing the argument for the priority of discrimination training among the sounds of a new language, it appears that an audio-lingual approach which recommends perceptual discrimination training among sounds before sound production training is based on several assumptions which are untested and may not obtain. At most, this criticism leaves the problem of the optimal sequence of discrimination and differentiation training in learning the phonology of a new language as an open question. What then of the alternative possibilities?

Concurrent training in discrimination and differentiation. A second feasible sequence for optimal discrimination and differentiation in learning language phonology is that the two should be taught concurrently. Carroll (1963, p. 1070) comments on the possible merit of this procedure.

> There is some evidence (Liberman, 1957)[1] that sound discrimination and sound production are related in a sort of regenerative feedback loop: that one learns to discriminate sounds which one can differentially produce and vice versa.

This view implies that concurrent training might constitute a particularly effective training procedure. It is possible that sound production training could increase the effectiveness of immediate sound discrimination training which allows "hearing" the sounds which have been produced, sound discrimination training might then facilitate further sound production learning, and so on. Concurrent training of this type might be particularly appropriate for the very young child who has learned neither to hear differences among sounds, nor to produce required distinctive sound patterns. The question of optimal sequence of training in this case might resolve to the problem of which should come first, "the chicken or the egg?"

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[1] Liberman's research, cited by Carroll, is discussed in detail farther on (v.i., p.). This research does not provide support for the relative effectiveness of concurrent training over other sequences.

Concurrent training also might be effective in learning a second language if the required learning tasks for the new language were the same as for the native language. However, it appears likely that the task of learning to distinguish among speech sounds may already have been accomplished to a large extent by students through their native language training (v.a., p.54and p.74). If this is true, then the important remaining tasks facing the second-language student would be the differentiation of new language utterances and learning appropriate occasions for these utterances. Carroll points out (p. 1070) that there is not enough evidence for a decision on whether teachers should assign priority to practice in sound (perceptual) discrimination or to practice in sound production. He suggests that most teachers treat these problems as correlative.

The priority of differentiation training. There is speculation, and some research, which strongly questions the value of discrimination preceding differentiation for most efficient language learning. The argument appears to hold for either the perceptual or the operant definition of discrimination. Liberman and co-workers refers to the evidence and speculation as a "motor theory of speech perception " (cited by Lane, 1964, p. 21, from Lisker, Cooper, and Liberman, 1962).

Liberman (1957), reviewing research on speech perception, suggests that "proprioceptive, as well as external acoustic stimulus dimensions must be taken into account in any attempt to explain speech perception." According to Liberman, when different articulatory responses are attached to similar external acoustic stimuli they may provide distinctive proprioceptive stimulation making the external stimuli more discriminable. He writes (p. 123):

> We should suppose that the perceived difference between two relatively similar external stimuli could be increased if we could attach to those stimuli two very different mediating responses and hence gain the added distinctiveness of their very different proprioceptive returns.

Liberman and co-workers came to their view of the importance of articulatory responses in speech perception by working with synthetic speech sounds which could be "written" for aural presentation to subjects. This work suggested that a phoneme is a category of sound patterns delineated by an articulated "label"; when such a labeling response has been attached to a range of differing phonemic stimuli, any of these stimuli are perceived as "the same sound." For example, English speaking subjects have the same articulatory label /g/ for a range of consonant-vowel sounds which include /gi/, /ge/, /gɛ/, /ga/, /gɔ/, /go/, /gu/. Spectrographic analysis of these sounds shows that the actual acoustic patterns of these stimuli show a continuous and systematic change except between /ga/ and /gɔ/ where there is a sharp discontinuity in the stimulus patterns. However, this discontinuity is not accompanied by a corresponding report from subjects that these patterns "begin with a different sound." This, Liberman suggests, is because subjects have learned the same articulatory label /g/for all the sounds.

Further evidence supports this view. It was demonstrated clearly that sounds can be discriminated much more easily when they are in different phoneme categories than when they are in the same category--even when the actual acoustic difference between them is the same (cf. Liberman, et al., 1957, Griffith, 1957). Using synthetic speech sounds it was possible to vary acoustic patterns systematically in 14 equal steps through three phonemes /b/, /d/, and /g/. Liberman (1957, p. 122) writes:

> We found in general that discrimination was better near the phonemic boundary than it was in the middle of the phonemic categories. This is to say that, with acoustic differences equal, our listeners more easily discriminated between sounds to which they habitually attach different phoneme labels than they did between sounds which they normally lump into the same phoneme class. Indeed, these effects were so great as to approximate rather closely to what we would expect to obtain on the basis of a most extreme assumption: namely, that the listener can discriminate these sounds only to the extent that he can identify them as different phonemes... It is tempting to speculate that what is learned is simply a connection between various acoustic stimuli and certain articulatory responses.

Lane (1964) cites a study by Holland and Matthews (1963) suggesting limited support for Liberman's thesis. These investigators compared several programs for conditioning /s/ discriminations with children who misarticulated /s/. They found that the form of the program which produced the most "spontaneous vocalizing by students" produced not only the greatest improvement on discrimination tests but also on /s/ articulation tests. They suggest a facilitating effect of vocalization on speech sound discrimination:

> These vocalizations might force careful observation of auditory cues, or they might provide supplemental kinesthetic stimuli which could be useful in close discriminations (quoted by Lane, 1964, p. 33).

Liberman (1957, p. 122) views articulatory responses as vocal or subvocal "mediating responses" which are attached to external stimuli. He concludes:

> All of this strongly suggests...that speech is perceived by reference to articulation--that is, that articulatory movements and their sensory effects mediate between the acoustic stimulus and the event we call perception.

Liberman's speculation that an articulatory response "mediates" between external acoustic stimuli and perception raises the thorny and difficult problem of the nature of perception, and Liberman becomes other than empirical in discussing whether articulatory responses are "central" or "peripheral." However, such speculation is not crucial for the significance of Liberman's research; it might just as well be speculated that articulatory response are the perceptions.

Liberman's research and rationale strongly imply a priority of response differentiation in learning language phonology. To summarize the argument, a certain articulated phonemic response may be attached to a particular range and variety of acoustic stimuli which constitute a phoneme category for the language. Logically, the articulatory response might only be occasioned by the various different stimuli of the phoneme category if it exists in some strength; this implies its prior differentiation.

It is tempting to imagine that Liberman's rationale might hold, not only at the level of speech phonemes, but also at the lexical, and even at the syntactic levels of language complexity. As discussed farther on (v.i., p. 82) the findings of Experiment I of the present study suggest that such an extension may be plausible.

Labeling

In Liberman's rationale, an articulatory response acts as a label for a phonemic category of acoustic stimuli making the members of the category more distinctive or discriminable. There is a body of research which suggests that this is a general effect of labeling which may be useful for interpreting the findings of the present study. When a response (label) is attached to any stimulus, it may thereby increase the effectiveness of the stimulus for controlling any other responses, i.e., labeling may function to make a stimulus generally more discriminative. Available evidence is seen in a sample of recent experiments. Norcross and Spiker (1957) had children respond by giving labels to pictures; this training facilitated the subsequent learning of new motor responses to these stimuli. Goss and Greenfield (1958) trained subjects by having them give different responses (largely verbal) to four light intensities; on the subsequent transfer-motor task of pushing a lever in one of four directions, subjects with preliminary training in labeling were clearly superior. Albert (1959) experimented with the discrimination of cylinders of various sizes, and concluded that verbal labels served as cue-producing responses. Reese (1960) demonstrated that the more distinctive the labels are, the more they facilitate a later motor task.

A labeling interpretation of the sequence finding. Why was a sequence of speaking training first more effective than listening comprehension training first for producing skill in the tests of listening comprehension of Experiment I? If it can be shown that the speaking-first groups profited more from listening comprehension training than did the listening comprehension-first groups, then this would account for the superior performance of the speaking-first groups on the listening comprehension tests.

One way to arrive at this conclusion is to show that speaking training produced effects which increased the effectiveness of subsequent listening comprehension training for the speaking-first groups. One such effect may have been an increase in the general discriminative function or "distinctiveness" of stimuli through labeling. As this possibility is discussed, it will be useful to refer to the paradigms below which summarize the training formats for Experiment I.

	Stimulus	Response	Confirmation
Speaking Training	Picture (S^D) Utterance (prompt)	Utterance	Hears utterance
Listening Comprehension Training	Several pictures Utterance (S^D)	Selects appropriate picture	Hears number of correct picture

The labeling effects of speaking training. During speaking training the subjects saw a picture and learned to emit an appropriate utterance through echoic response differentiation. Two types of labeling may have increased the discriminative function of stimuli.

(1) The utterance as a response during echoic training may have become an articulatory label for the class of all similar stimulus utterances (e.g., the utterance spoken with different intonation, by different speakers). A stimulus utterance of a class would thereby become more discriminable, since the articulatory response to it would provide additional kinesthetic discriminative stimulation. This effect would represent a straightforward extension of Liberman's rationale beyond

the level of single phonemes to more lengthy speech sound patterns.

(2) Speaking training also brought a newly differentiated utterance under the control of an appropriate picture as a discriminative stimulus. The utterance as a label for the picture may have increased discriminative control of particular features of the picture. For example, if a subject learned to say La fille est assise, when a picture of a girl sitting was presented, and La fille est debout when a picture was that of a girl standing, the sitting-standing aspect of each of the pictures would thereby become an effective discriminative stimulus.

Interpretation of the listening comprehension test results. The listening comprehension training required subjects to select an appropriate picture from alternatives when they heard an utterance. During prior speaking training, the speaking-first groups learned an articulatory response to the stimulus of the picture, and echoically, to the utterance. This prior training may have increased the general discriminative function or "distinctiveness" of these stimuli making them more effective during subsequent listening comprehension training. Therefore, during listening comprehension training, the speaking-first groups may have responded more discriminatively to the utterances they heard and to the features of an appropriate picture before selecting it. The speaking-first groups would thereby profit more from the listening comprehension training than the listening comprehension-first groups who did not have the advantage of prior speaking training.

Reversibility

A number of research studies have suggested a reversibility of stimulus and response functions such that learning to give response *B* to stimulus *A* later facilitates giving *A* as a response to *B* as a stimulus. This reversibility effect was taken as a basis for reporting the French Phoneme Experiment (Mace and Keislar, 1964) which led to the present study. In the phoneme experiment the only difference between the Experimental Group and the Control Group was that the Experimental Group received training in circling the correct printed form of French words when they heard these words pronounced by a French speaker; control was exercised so that all subjects received equal response practice and exposure to the materials. The Experimental Group excelled the Control Group on a test in which the printed words were used as S^D's for pronunciation responses. Since neither the Experimental Group nor the Control Group received specific training in this task it was concluded that a reversibility of the stimulus and response functions occurred for the subjects in the Experimental Group.

Perhaps the first formal recognition of a reversibility effect was in Thorndike's (1932, p. 154) principle of *polarity* according to which "the forward connection will be stronger, other things being equal, than the backward." Murdock (1956) and Feldman and Underwood (1957) demonstrated a reversibility relationship with verbal paired associates as stimulus and response terms. They referred to the effect as an R-S or reverse association as opposed to S-R or forward association; and suggested that it might be thought of as an example of "incidental learning" since subjects learned a reverse association without being instructed to do so. Investigations by Kjeldergaard and Horton (1960) and Cramer and Cofer (1960) were accounted for in terms of backward associations in which learning A→B simultaneously established a B→A connection. McCormack (1961) similarly obtained what he calls backward mediated positive transfer in a paired associate task.

Reversibility and the sequence finding. Althought the fact of stimulus-response reversibility itself needs explanation, the effect may be used as a descriptive device in accounting for the findings of Experiment I. It might be argued that the speaking-first groups profited from the effect of reversibility during listening comprehension training. The speaking-first groups learned well-differentiated overt vocalizations to pictures as discriminative stimuli during speaking training. Their subsequent listening comprehension training required a reversal of these stimulus and response terms; here, it was necessary for the subjects to select a picture when they heard the utterance. Through reversibility the speaking-first groups may already have acquired listening comprehension skill prior to the listening comprehension training, and thereby would be brought ultimately to a higher level of performance during listening comprehension training. The listening comprehension-first groups, on the other hand, did not receive the speaking training until after their listening comprehension training. Therefore they could not profit by the effect of reversibility during listening comprehension training. This would account for the superior performance of the speaking-first groups on the tests of listening comprehension.

Recency of Training

Recency of training may have influenced the results of Experiment I. The Listening Comprehension Test was administered to all subjects at the conclusion of the two-week program of training. One of the speaking-first groups had just completed one full week of training in the listening comprehension format and therefore may have had less time before the Listening Comprehension Test to "forget." This might account for the superior performance of the speaking-first groups on the test.

If the results were largely due to recency of training, however, it might be expected that a difference between the speaking-first groups and the listening comprehension-first groups would diminish when the same listening comprehension test again was administered two weeks after training in order to assess retention of listening comprehension. This was not the case. The difference between the speaking-first and listening comprehension-first groups was more pronounced after two weeks had elapsed than at the conclusion of training. This makes an interpretation in terms of recency less plausible.

On the other hand, more pronounced differences between the groups on the retention test may itself be accounted for alternatively. It might be argued that the speaking-first groups who did better on the Listening Comprehension Test immediately following training gained skill by taking this test. The speaking-first groups who did better the first time they took the test may have profited more from taking the test than the listening comprehension-first groups. This difference in gain from taking the test initially might account for more extreme differences on the retention test two weeks later.

Experiment II

Learning Vocabulary Skills

Experiment II (presented in Chapter III) was designed to study the effect of training in certain vocabulary skills on the facility of learning others. The purpose here is to relate the findings of Experiment II to those of Experiment I of this study and to interpret the findings of Experiment II in light of the role of textual skills and "context" in learning second language vocabulary. This discussion follows an overview of vocabulary skills as they were introduced in Experiment II.

Vocabulary skills studied in Experiment II. The procedure of Experiment II is summarized in Figure 10. For three French vocabulary

S_1 subject sees picture	R_1 subject selects picture
S_2 subject hears word	R_2 subject says word
S_3 subject sees word written	R_3 subject writes word

Group I	Group II	Group III	Group IV	Group V	
S_1R_1	S_1R_1	S_1R_1	S_1R_1	S_1R_1	Picture Identification
S_2R_2	S_2R_2	S_2R_2	S_2R_2	S_2R_2	Echoic Responding
S_3R_3	S_3R_3	S_3R_3	S_3R_3	S_3R_3	Transcription
	S_1R_2	S_1R_2	S_1R_2	S_1R_2	Speaking (Tacting)
		S_2R_3	S_2R_3	S_2R_3	Dictation
			S_3R_2	S_3R_2	Texting
				S_3R_1	Reading Comprehension
S_2R_1	S_2R_1	S_2R_1	S_2R_1	S_2R_1	Listening Comprehension Test
S_1R_3	S_1R_3	S_1R_3	S_1R_3	S_1R_3	Writing Test

Figure 10

Vocabulary Item Paradigm and Vocabulary Discriminations with Corresponding Skills Established for Five Treatment Groups in Experiment II items, equal training was first given all subjects in three formal discriminations: picture identification (matching pictures to sample); echoic responding (repeating aurally presented words); and transcription (copying a text). Then, training in an additional number of cross-discriminations was systematically varied for five treatment groups who were taught 0, 1, 2, 3, and 4 cross-discriminations respectively. The skills required in these additional cross-discriminations, in the order in which they were introduced, were as follows: speaking or tacting (subject sees picture, says word); dictation (subject hears word, writes word); texting (subject sees word written, says word); and reading comprehension (subject sees word written, selects picture). Finally, two test-tasks were administered to all subjects. These tests required learning the two cross-discriminations which were not taught previously, listening comprehension (subject hears word, selects picture), and writing (subject sees picture, writes word). The results for the Listening Comprehension Test showed an increasing linear function between the number of vocabulary tasks (cross-discriminations) taught during training, and the facility of learning the listening comprehension task. No trend was shown for the results of the Writing Test.

The results of Experiment II suggest that, for the particular skills in the order in which they were introduced, the facility of learning in the listening comprehension test-task was related to the number of other vocabulary skills established during training. Different skills chosen for training might have been taught in many different training orders, and any two of the skills might have been used as test-tasks. Thus, the findings of the experiment hold only for the particular training sequence and test-tasks which were studied.

Experiment II related to Experiment I. Within the limitation of order and particular skills chosen for study, the results of the Listening Comprehension Test for Experiment II may be interpreted and related to the findings of Experiment I. The data for the Listening Comprehension Test of Experiment II suggest that Group I, with no additional training beyond the three formal discriminations, did poorly in learning the listening comprehension task; Groups II, III, and IV which learned speaking, dictation, and texting in addition did better; and Group V which had additional training in reading comprehension did best of all. (V. a. Figure 8, p. 48, for the means of the treatment groups presented graphically.)

Relating these findings to those of Experiment I, it may be noted that Groups II, III, IV, and V had speaking training prior to the test-task of listening comprehension, while Group I did not. It was suggested that prior speaking training in Experiment I may have increased the effectiveness of subsequent listening comprehension training. This same interpretation is plausible for the findings of the Listening Comprehension Test of Experiment II. As in Experiment I, prior speaking training may have increased the general discriminative function of stimuli and produced a reversibility of stimulus and response functions providing listening comprehension skill prior to the listening comprehension test-task. This would partially explain the general superiority on the listening comprehension test-task of the four groups which had prior speaking training.

Textual skills in Experiment II. The finding of a general linear trend between number of skills taught during training and the facility of learning the task of listening comprehension suggests that skills other than speaking probably produced facilitative effects during the listening comprehension test-task. Other skills taught were dictation, texting, and reading comprehension. The linear trend is not sensitive enough as a dependent variable to justify more than speculation as to how the interrelated influence of these skills may have produced the finding. However, effects analogous to those discussed for speaking training are at least possible. In dictation training, the subjects gave a spelling response as a label for an aurally presented word. In texting training, the subjects saw a printed word projected on the screen and labeled it by giving a pronunciation response. In reading comprehension training, a printed word was projected on the screen and the subjects selected one of three numbered pictures as a label for the printed word. It appears that the effect of training in these three additional skills may have increased the effectiveness of training during the listening comprehension test-task above the increase provided by the speaking training alone.

Explaining the facilitative effect of dictation, texting, and reading comprehension during listening comprehension training is complicated since the effects of the three types of training are confounded. However, it may be pluasible to suppose that both reversibility of stimulus and response functions, and an increase in the general discriminative function of stimuli through labeling during the three types of textual training, may have acted to produce increased effectiveness of training during the listening comprehension test-task.

The effect of context on vocabulary learning. According to Carroll (1963, p. 1076), most language teachers favor methods by which new words are learned in "meaningful contexts." He writes:

> If context is anything that provides more associations and greater meaningfulness in materials to be learned, we can expect context to be beneficial, for recent psychological research has emphasized the important role of meaningful associations in learning.

The independent variable in Experiment II was number of cross-discriminations established by training. It is plausible to consider this variable as an operational definition of available associative context for vocabulary learning. Each of the five treatment groups learned a different number of cross-discriminations or "associations" for three vocabulary items, which may have provided differing amounts of context during the test-task of listening comprehension. By this interpretation, a relationship was shown between the amount of available associative context and the facility of learning in the listening comprehension test-task.

Two of the four cross-discriminations learned during training used "meaningful" pictures as stimulus or response terms; these were speaking (S_1R_2), and reading comprehension (S_3R_1). The addition of these "meaningful" cross-discriminations appeared to produce particularly noticeable increments in the effectiveness of training during the listening comprehension test-task and may have been largely responsible for the increasing linear function which was shown in the results. Much research has been done on the facilitative effect of "meaningful" materials in a language learning task. Carroll (1963, p. 1077) summarizes this research for the case of learning second-language vocabulary as follows:

> ...a generalization directly applicable to foreign language teaching seems fairly well established: foreign words are best learned (and probably better retained) when presented in association with the objects, actions, qualities and conditions which are their referents.

After listing the studies upon which this generalization is based, Carroll points out that many of these studies are limited in design and should be repeated.

CHAPTER VI

SUMMARY AND IMPLICATIONS OF THE STUDY

Two concepts have been examined which seem useful in the analysis of language learning. The language community teaches the individual what responses to make by response differentiation; the community also teaches the individual when to make these responses by stimulus discrimination. It has been the general purpose of this study to investigate the manner in which the two processes of response differentiation and stimulus discrimination enter into learning French language skills. Two specific problems have been explored.

Experiment I

The first problem is the sequence of differentiation and discrimination training which will produce the most effective language learning. Experiment I was carried out to explore the relative merits of several possible sequences: response differentiation first; discrimination training first; and, concurrent training in both response differentiation and stimulus discrimination.

Procedure and results. A ten-lesson automatically presented program of French instruction was developed for children in the early primary grades. There were five lessons of "speaking" training which emphasized the differentiation of new responses; by this training the children learned to make grammatical utterances when they saw pictures projected on the screen. There were also five lessons of "listening comprehension" training which emphasized the process of stimulus discrimination; through this training the children learned to discriminate among utterances they heard, selecting an appropriate picture for each utterance. One hundred and eight subjects were assigned to four treatment groups, 27 in each group: the first group received five days of speaking training followed by five days of listening comprehension training; the second group received five days of listening comprehension training followed by five days of speaking training; the third group received ten days of concurrent training with short, fifteen-frame segments of speaking training followed by corresponding fifteen-frame segments of listening comprehension training; training for the fourth group was the same, except that the short segments of listening comprehension training were given before the segments of speaking training. The content learned by the four experimental groups was identical; only the sequence of speaking and listening comprehension training was varied. Tests of listening comprehension and speaking were administered following the ten-day instructional program.

The treatment groups which had received speaking training first excelled the groups receiving listening comprehension training first on a test of listening comprehension given at the conclusion of instruction. This difference was more pronounced when the same listening comprehension test was given as a retention test two weeks following instruction. The results indicated that the two sequences of speaking training first were more effective in producing listening comprehension skill than were the two sequences of listening comprehension training first. The results obtained with the speaking test were inconclusive.

Discussion. The argument that discrimination or "ear" training should take priority over response differentiation or sound production in language instruction was credited to proponents of the audio-lingual approach. This argument appeared to be based largely upon speculation and untested assumptions. In general, little controlled experimentation could be found which might guide teachers in selecting the most effective sequence of instructional procedures. However, evidence from the work of Liberman and his co-workers was discussed which suggests a "motor theory of speech perception." According to the evidence, similar speech sounds are recognized as "the same" if an individual has learned one "articulatory label" as a response to them, while they are recognized as "different" if he has learned different articulatory responses to them. This might suggest a priority of response differentiation in teaching language phonology, with emphasis first upon differentiation of correct articulatory responses to appropriate classes of similar speech sounds.

The findings of Experiment I were interpreted in terms of the general effect of verbal labels in making any stimuli more "discriminative." Liberman speculates that "distinctive proprioceptive stimuli" from an articulatory response add to the stimuli of a class of speech sounds to make these stimuli more discriminable; this was referred to as an "increased discriminative function of stimuli" through articulatory labeling. One interpretation of the findings of Experiment I was offered in terms of these labeling effects: the groups which had response differentiation first, during speaking training, may have profited more from subsequent listening comprehension training; for these speaking-first groups, utterances and relevant features of pictures presented as stimuli may have been more discriminative during listening comprehension training as a result of prior labeling.

A second, purely descriptive interpretation of the sequence finding of Experiment I was offered according to a reversibility effect of stimulus and response functions. Research was summarized showing that when a response B is learned to a stimulus A, a reversibility of these stimulus and response terms may occur so that B as a stimulus evokes A as a response. Speaking training required making an utterance as a response to a picture as a stimulus; for the speaking-first groups, subsequent listening comprehension training required the reverse of these stimulus response functions, i.e., selecting the picture as a response to the utterance as a stimulus. Through reversibility, the speaking-first groups may have begun listening comprehension training with a relatively higher degree of skill in listening comprehension, being brought ultimately to a higher level of listening comprehension performance as shown on the listening comprehension tests.

Recency of training provided a third possible interpretation for the higher level of listening comprehension performance by the speaking-first groups. When the listening comprehension test was given at the conclusion of instruction, one speaking-first group had just completed a full week of listening comprehension training. Therefore, this group may have had less time to "forget" than the listening comprehension-first group which had completed such training a week earlier. Although the difference between the groups held up well after a two-week interval following the training when the Listening Comprehension Test was administered again, the effect of recency of training cannot be discounted; the groups which did better on the Listening Comprehension Test the first time it was given may have profited more from this first administration than other groups. This would account for the better performance of the speaking-first groups the second time the test was administered.

Experiment II

The second problem of the study, investigated in Experiment II, was the relationship between number of vocabulary skills established by training and the facility of learning other vocabulary skills.

Procedure and results. First, for three French vocabulary items, 100 third-grade children assigned to five treatment groups, were all given equal training in three discrimination skills emphasizing response differentiation; these skills were picture identification, echoic responding, and transcription. Then, each group of 20 subjects was given training in a different number of additional discrimination skills. The groups received additional training in 0, 1, 2, 3, and 4 additional skills respectively; in the order of their introduction, these additional skills were speaking, dictation, texting, and reading comprehension. Total exposure to stimuli and total response practice was equated for all groups by providing each group with an appropriate amount of exposure and practice in addition to its particular training. Finally, all subjects were given test-tasks in the novel cross-discrimination skills of listening comprehension and writing. The facility with which the subjects acquired skill in these test-tasks was the dependent variable in the experiment. An increasing linear function was shown between number of cross-discrimination skills established by training and performance during the listening comprehension test-task. The results of the writing test were inconclusive.

Discussion. The interpretation of the findings of Experiment II fit well with those of Experiment I. Effects due to reversibility and labeling coming from speaking training in each experiment, may have contributed not only to the effectiveness of subsequent listening comprehension training in Experiment I, but also to the linear relationship shown in Experiment II. In the latter study three other textual skills (dictation, texting and reading comprehension) may also have contributed to the linear relationship.

It was pointed out that the independent variable in Experiment II, number of discriminations established by training, might be taken as an operational definition of what has been called "meaningful associative context" in vocabulary learning and that the finding could be viewed according to the notion that "amount of context" or "number of associations" available through training is related to the facility of learning a given vocabulary skill.

Implications of the Study

Three kinds of implications are suggested by the study: further research, language teaching procedures, and clarification of language used in language teaching.

Further research. The two experiments carried out in this study imply several further experiments.

Experiment I should be replicated with modifications and refinements of techniques which would provide increased experimental control. Interaction among subjects might be reduced, perhaps by using activated earphones so that each subject would hear himself, but not other subjects. To insure necessary vocal responding, a device such as a sound-operated relay might be used to encourage all subjects to emit utterances which could then be shaped echoically.

An interpretation of the Listening Comprehension Test findings of Experiment I in terms of recency of training is plausible but trivial. The possibility of this interpretation would be reduced by postponing any testing for several seeks following training. If a listening comprehension test given two weeks following training showed, for example, that speaking-first groups excelled listening comprehension-first groups, the difference could not be so readily attributed to the fact that the speaking-first subjects had just completed listening comprehension training.

The speaking training in Experiment I required more than shaping utterances through response differentiation. Stimulus discrimination was also emphasized as these utterances were brought under control of pictures as stimuli. This interferes with answering the question of the optimal sequence of differentiation and discrimination training, since the speaking training did not provide "pure" response differentiation training. An experiment using only echoic response differentiation training in place of the speaking training would obviate this problem.

Experiment II studied the effect of learning certain vocabulary skills on the facility of learning others. It was pointed out that the particular skills chosen for training and the order of their introduction is only one of many possibilities. In order to answer the general question of a relationship between number of skills established by training and facility of learning other skills, all possible orders could be enumerated and a sample of these drawn for consideration in an experiment.

Also, certain vocabulary skills as studied in Experiment II may be particularly important in facilitating the learning of other skills, and particular orders may be relatively more effective. These and other questions might be investigated within the discrimination learning framework developed in Experiment II.

Language teaching procedures. Certain implications for language teaching are suggested by the two experiments which have been carried out.

Experiment I gave no support to the formal tenet of the audio-lingual approach (Brooks, 1960, p. 107) which recommends that listening comprehension precede sound production training. In fact, in terms of the finding obtained, Experiment I would support the opposite conclusion, i.e., for most effective acquisition of listening comprehension skills, differentiation of utterances as responses through speaking should precede discrimination training through listening comprehension. At present, the issue of the optimal sequence of training in the skills of a second language is an open research question.

Experiment II emphasizes that learning a "word" in a second language involves at least nine different but related vocabulary skills which might all receive attention through appropriate instructional procedures. Although training in one test-task (listening comprehension) was shown by the experiment to be effective to the extent that other skills had already been learned, "transfer" from these other skills was never perfect; improvement through training was noted even when most of the alternative skills had been taught. This implies that a teacher should probably regard each vocabulary skill to be taught as a separate objective and not assume that learning will occur "incidently" with training in related skills.

Clarification of language used in language teaching. Just what is it that a language student is doing when he "understands" and "speaks" a language? In this study questions such as these have been examined with perspective provided by two conceptual tools, response differentiation and stimulus discrimination. An attempt has been made to analyze language skills operationally and to describe a particular skill in terms of observable language responses under the control of identifiable stimuli. This approach has had at least two advantages. For one thing, it has readily suggested the technical procedures for preparing instructional materials which were needed to investigate the particular problems of the experiments.

Also, an operational approach tended to clarify and point up problems with the language which is often used to talk about language teaching. For example, the term discrimination, as used by linguists and phoneticians, usually has a perceptual definition: a student discriminates if he "hears" a sound or sound pattern. A meaning such as this interferes with language task analysis since the dimensions of the response are difficult to specify. Also, since a perceptual response is not open to public identification, it is difficult for a teacher to know when or if the response is occurring and to arrange conditions for its acquisition. These problems may make the teaching of discrimination less effective. A solution suggested by an operational view is to focus, not upon what a student "hears," but rather upon what he "does;" an observable response becomes the criterion for the occurrence of a particular discrimination.

It appears that many of the problems of language teaching may be dealt with more effectively when they are clarified by technical language which emphasizes variables and operations which are "out in the open." The present study represents an application of such language which may become increasingly useful in the coming technology of language instruction.

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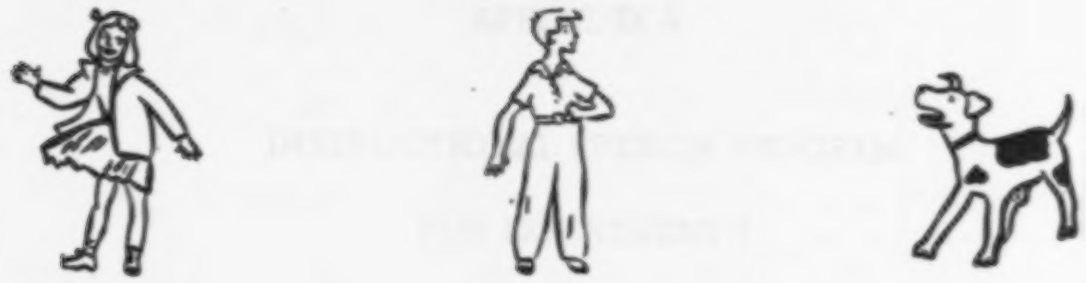
APPENDICES

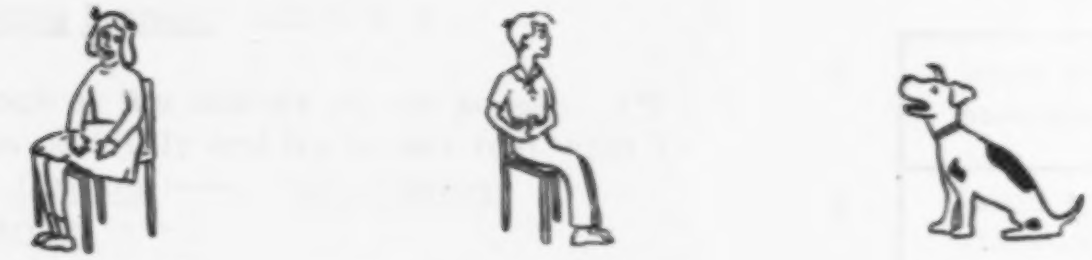
In the programmed materials described in the appendices, the presentation of a 35 mm. slide flashed on the screen is indicated by an asterisk (*). Three dashes (---) indicates a pause in the taped narrative providing the subjects with an opportunity to respond. Pictorial stimuli presented from 35 mm. slides are included in Figure 11 p.110 and in Figure 12, p.180. The labels of the pictures are used in the text of the programmed materials.



large girl standing

large boy standing

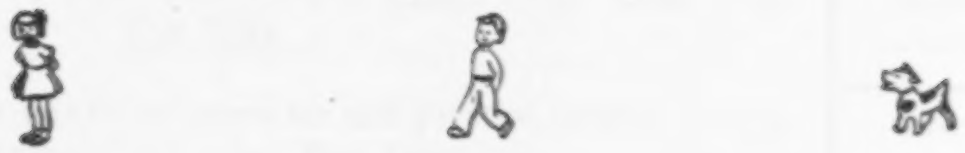
large dog standing



large girl sitting

large boy sitting

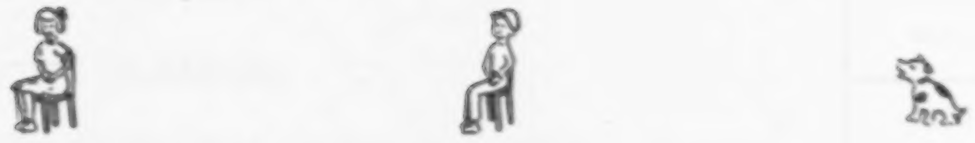
large dog sitting



small girl standing

small boy standing

small dog standing



small girl sitting

small boy sitting

small dog sitting

Figure 11 Pictorial Stimuli for Programmed Materials of Experiments I and II

APPENDIX A

INSTRUCTIONAL FRENCH PROGRAM

FOR EXPERIMENT I

Taped Narrative		35 mm. Slides
Speaking Frames: LESSON I		
1. Look at the picture on the screen. (*) Listen carefully and try to say just what I say. Garcon ---. Un...garcon ---. Un garcon ---.	1	large boy standing
2. Try it again as soon as the picture comes on the screen. (*) --- Un garcon.	2	large boy standing
3. (*) Say just what I say. Fille ---. Une ...fille ---. Une fille ---.	3	large girl standing
4. Try it again as soon as the picture comes on the screen. (*) --- Une fille.	4	large girl standing
5. Speak as soon as the picture comes on the screen. (*) --- Un garcon.	5	large boy standing
6. (*) --- Une fille.	6	large girl standing
7. (*) --- Un garcon.	7	large boy standing
8. (*) Try to say just what I say. Chien ---. Un...chien ---. Un chien ---.	8	large dog standing
9. Speak as soon as the picture comes on the screen. (*) --- Un chien.	9	large dog standing
10. Try this again. (*) --- Une fille.	10	large girl standing
11. Speak as soon as the picture comes on the screen. (*) --- Un chien.	11	large dog standing

12. (*) --- Un garcon.

13. (*) --- Un chien.

14. (*) --- Une fille.

15. (*) --- Un chien.

16. Speak as soon as the picture comes on the screen. (*) --- Une fille.

17. (*) --- Une fille.

18. Try this. (*) --- Un chien.

19. (*) --- Un chien.

20. (*) --- Une fille.

21. (*) --- Un chien.

22. (*) --- Une fille.

23. Try this. (*) --- Un garcon.

24. (*) --- Un garcon.

25. (*) --- Un chien.

26. (*) --- Un garcon.

12	large boy standing
13	large dog standing
14	large girl standing
15	large dog standing
16	large girl standing
17	large girl standing
18	large dog standing
19	large dog standing
20	large girl standing
21	large dog standing
22	large girl standing
23	large boy standing
24	large boy standing
25	large dog standing
26	large boy standing

27. (*) --- Une fille.

28. (*) --- Un garcon.

29. (*) --- Un chien.

30. (*) --- Un garcon.

31. Try to say just what I say. (*) Un chien ---. C'est...un chien ---. C'est un chien ---.

32. Once again as soon as the picture comes on the screen. (*) --- C'est un chien.

33. (*) Try to say just what I say. Un garcon ---. C'est...un garcon ---. C'est un garcon ---.

34. Once again as soon as the picture comes on the screen. (*) --- C'est un garcon.

35. Speak as soon as the picture comes on the screen. (*) --- C'est un chien.

36. (*) --- C'est un garcon.

37. (*) --- C'est un chien.

38. (*) Say just what I say. Une fille ---. C'est...une fille ---. C'est une fille ---.

39. Once again as soon as the picture comes on the screen. (*) --- C'est une fille.

40. Try this again. (*) --- C'est un garcon.

41. Speak as soon as the picture comes on the screen. (*) --- C'est une fille.

27	large girl standing
28	large boy standing
29	large dog standing
30	large boy standing
31	large dog standing
32	large dog standing
33	large boy standing
34	large boy standing
35	large dog standing
36	large boy standing
37	large dog standing
38	large girl standing
39	large girl standing
40	large boy standing
41	large girl standing

42. (*) --- C'est un chien.

43. (*) --- C'est une fille.

44. (*) --- C'est un garcon.

45. (*) --- C'est une fille.

46. Speak as soon as the picture comes on the screen. (*) --- C'est un garcon.

47. (*) --- C'est une fille.

48. (*) --- C'est un garcon.

49. (*) --- C'est une fille.

50. (*) --- C'est un chien.

51. (*) --- C'est un garcon.

52. Speak as soon as the picture comes on the screen. (*) --- C'est un chien.

53. (*) --- C'est une fille.

54. (*) --- C'est un chien.

55. (*) --- C'est un garcon.

56. (*) --- C'est une fille.

42	large dog standing
43	large girl standing
44	large boy standing
45	large girl standing
46	large boy standing
47	large girl standing
48	large boy standing
49	large girl standing
50	large dog standing
51	large boy standing
52	large dog standing
53	large girl standing
54	large dog standing
55	large boy standing
56	large girl standing

57. (*) --- C'est un chien.	57	large dog standing
58. (*) --- C'est un garcon.	58	large boy standing
59. (*) --- C'est une fille.	59	large girl standing
60. (*) --- C'est un chien.	60	large dog standing

Speaking Frames: LESSON II

1. Look at the word on the screen. (*) Try to say just what I say: Non ---.	1	non
2. Try it again as soon as the word comes on the screen. (*) --- Non.	2	non
3. Once again. (*) --- Non.	3	non
4. Look at this word. (*) Try to say just what I say. Oui --- .	4	oui
5. Try it again as soon as the word comes on the screen. (*) --- Oui.	5	oui
6. Once more. (*) --- Oui.	6	oui
7. Try this again as soon as the word comes on the screen. (*) --- Non.	7	non
8. Once again. (*) --- Non.	8	non
9. This again. (*) --- Oui.	9	oui
10. (*) --- Oui.	10	oui

11. Speak as soon as the word comes on the screen. (*) --- Non.

12. (*) --- Oui.

13. (*) --- Oui.

14. (*) --- Non.

15. (*) --- Oui.

16. Look at the picture on the screen. (*) Try to say just what I say. C'est une fille. --- Oui, c'est une fille.

17. I'll ask a question and you answer by saying, Oui, c'est une fille. (*) Est-ce une fille? --- You should have said, Oui, c'est une fille.

18. Try it again. (*) Est-ce une fille? --- You should have said, Oui, c'est une fille.

19. (*) Try to say just what I say. Non, c'est un chien. --- Answer the question: Est-ce une fille? --- You should have said Non, c'est un chien.

20. (*) Try to say just what I say. C'est un chien. --- Oui, c'est un chien.

21. (*) Answer the question: Est-ce un chien? --- You should have said, Oui, c'est un chien.

22. Try it again. (*) Est-ce un chien? --- Oui, c'est un chien.

23. (*) Try to say just what I say. Non,c'est une fille. --- Answer the question: Est-ce un chien? --- Non, c'est une fille.

24. (*) Est-ce une fille? --- Oui, c'est une fille.

11	non
12	oui
13	oui
14	non
15	oui
16	large girl standing
17	large girl standing
18	large girl standing
19	large dog standing
20	large dog standing
21	large dog standing
22	large dog standing
23	large girl standing
24	large girl standing

25. (*) Est-ce une fille? --- Non, c'est un chien.

26. (*) Est-ce un chien? --- Oui, c'est un chien.

27. (*) Try to say just what I say. C'est un garcon. --- Oui, c'est un garcon.

28. Answer the question. (*) Est-ce un garcon? --- You should have said, Oui, c'est un garcon.

29. Once again. (*) Est-ce un garcon? --- Oui, c'est un garcon.

30. (*) Est-ce un garcon? --- Non, c'est une fille.

31. (*) Look at the screen. I'll ask a question: Est-ce une fille? And you answer by saying, Oui, c'est une fille. Est-ce une fille? --- Oui, c'est une fille.

32. Try it again. (*) Est-ce une fille? --- Oui, c'est une fille.

33. Look at this picture. (*) I'll ask a question: Est-ce une fille? And you answer by saying, Non, c'est un garcon. Est-ce une fille? --- Non, c'est un garcon.

34. (*) I'll ask, Est-ce un garcon? And you answer, Oui, c'est un garcon. Est-ce un garcon? --- Oui, c'est un garcon.

35. (*) I'll ask, Est-ce un garcon? And you answer, Non, c'est une fille. Est-ce un garcon? --- Non, c'est une fille.

36. (*) Answer the question. Est-ce une fille? --- Oui, c'est une fille.

25	large dog standing
26	large dog standing
27	large boy standing
28	large boy standing
29	large boy standing
30	large girl standing
31	large girl standing
32	large girl standing
33	large boy standing
34	large boy standing
35	large girl standing
36	large girl standing

37. (*) Est-ce une fille? --- Non, c'est un garcon.

38. (*) Est-ce un garcon? --- Oui, c'est un garcon.

39. (*) Look at this picture. I'll ask, Est-ce un garcon? And you answer, Non, c'est un chien. Est-ce un garcon? --- Non, c'est un chien.

40. (*) I'll ask, Est-ce un chien? And you answer, Oui, c'est un chien. Est-ce un chien? --- Oui, c'est un chien.

41. (*) Answer the question, Est-ce un chien? --- Non, c'est un garcon.

42. (*) Est-ce un garcon? --- Oui, c'est un garcon.

43. (*) Est-ce un garcon? --- Non, c'est un chien.

44. (*) Est-ce un chien? --- Oui, c'est un chien.

45. (*) Est-ce un chien? --- Non, c'est une fille.

46. Answer the question. (*) Est-ce une fille? --- Oui, c'est une fille.

47. (*) Est-ce une fille? --- Non, c'est un chien.

48. (*) Est-ce une fille? --- Non, c'est un garcon.

49. (*) Est-ce une fille? --- Oui, c'est une fille.

50. (*) Est-ce un garcon? --- Oui, c'est un garcon.

37	large boy standing
38	large boy standing
39	large dog standing
40	large dog standing
41	large boy standing
42	large boy standing
43	large dog standing
44	large dog standing
45	large girl standing
46	large girl standing
47	large dog standing
48	large boy standing
49	large girl standing
50	large boy standing

51. (*) Est-ce un garcon? --- Non, c'est une fille.	51	large girl standing
52. (*) Est-ce un garcon? --- Non, c'est un chien.	52	large dog standing
53. (*) Est-ce un garcon? --- Oui, c'est un garcon.	53	large boy standing
54. (*) Est-ce un chien? --- Oui, c'est un chien.	54	large dog standing
55. (*) Est-ce une fille? --- Non, c'est un garcon.	55	large boy standing
56. (*) Est-ce un garcon? --- Non, c'est un chien.	56	large dog standing
57. (*) Est-ce un garcon? --- Oui, c'est un garcon.	57	large boy standing
58. (*) Est-ce une fille? --- Oui, c'est une fille.	58	large girl standing
59. (*) Est-ce une fille? --- Non, c'est un garcon.	59	large boy standing
60. (*) Est-ce une fille? --- Non, c'est un chien.	60	large dog standing
Speaking Frames: LESSON III		
1. Look at the picture on the screen. (*) Try to say just what I say. C'est un chien. ---	1	large dog standing
2. (*) Chien ---. Petit...chien ---. Un...petit chien ---. C'est...un petit chien ---. C'est un petit chien ---.	2	small dog standing
3. Try it again as soon as the picture comes on the screen. (*) --- C'est un petit chien.	3	small dog standing

4. Try to say what I say. (*) C'est une fille. ---

5. (*) Fille ---. Petite...fille ---. Une...petite fille ---. C'est...une petite fille ---. C'est une petite fille ---.

6. Try it again as soon as the picture comes on the screen. (*) --- C'est une petite fille.

7. Try to say just what I say. (*) Chien ---. Petit...chien ---. Un...petit chien ---. C'est...un petit chien ---. C'est un petit chien ---.

8. Try it again as soon as the picture comes on the screen. (*) --- C'est un petit chien.

9. Try this again as soon as the picture comes on the screen. (*) --- C'est un petit chien.

10. Try it again. (*) --- C'est une petite fille.

11. Try this again. (*) --- C'est un petit chien.

12. (*) --- C'est une petite fille.

13. Try to say just what I say. (*) C'est un garcon. ---

14. (*) Garcon ---. Petit...garcon ---. Un...petit garcon ---. C'est...un petit garcon ---. C'est un petit garcon ---.

15. Try it again as soon as the picture comes on the screen. (*) --- C'est un petit garcon.

16. Speak just as soon as the picture comes on the screen. (*) --- C'est un petit garcon.

4	large girl standing
5	small girl standing
6	small girl standing
7	small dog standing
8	small dog standing
9	small girl standing
10	small girl standing
11	small dog standing
12	small girl standing
13	large boy standing
14	small boy standing
15	small boy standing
16	small boy standing

17. Try to say just what I say. (*) Garcon ---. Grand...garcon ---. Un...grand garcon ---. C'est...un grand garcon ---. C'est un grand garcon ---.

18. Try it again as soon as the picture comes on the screen (*) --- C'est un grand garcon.

19. Try this again. (*) --- C'est un petit garcon.

20. Try this again. (*) --- C'est un grand garcon.

21. (*) --- C'est un petit garcon.

22. Try to say just what I say. (*) Fille ---. Grande...fille ---. Une...grande fille ---. C'est...une grande fille ---. C'est une grande fille ---.

23. Try it again as soon as the picture comes on the screen. (*) --- C'est une grande fille.

24. Try this. (*) --- C'est une petite fille.

25. Try this again. (*) --- C'est une grande fille.

26. Try this. (*) --- C'est un petit chien.

27. Try to say just what I say. (*) Chien ---. Grand...chien ---. Un..grand chien ---. C'est...un grand chien ---. C'est un grand chien ---.

28. Try it again as soon as the picture comes on the screen. (*) --- C'est un grand chien.

29. Try this again. (*) --- C'est un petit chien.

30. Try this again. (*) --- C'est un grand chien.

17	large boy standing
18	large boy standing
19	small boy standing
20	large boy standing
21	small boy standing
22	large girl standing
23	large girl standing
24	small girl standing
25	large girl standing
26	small dog standing
27	large dog standing
28	large dog standing
29	small dog standing
30	large dog standing

31. Look at the picture on the screen. (*) I'll ask a question: Est-ce un grand chien? And you answer by saying, Oui, c'est un grand chien. Let's try it now. Est-ce un grand chien? --- Oui, c'est un grand chien.

32. Look at this picture. (*) I'll ask a question: Est-ce un petit chien? And you answer by saying, Oui, c'est un petit chien. Try it now. Est-ce un petit chien? --- Oui, c'est un petit chien.

33. (*) I'll ask, Est-ce un petit chien? And you answer by saying, Non, c'est un grand chien. Try it now. Est-ce un petit chien? --- Non, c'est un grand chien.

34. (*) I'll ask, Est-ce une grande fille? And you answer, Oui, c'est une grande fille. Est-ce une grande fille? --- Oui, c'est une grande fille.

35. (*) I'll ask, Est-ce une petite fille? And you answer, Oui, c'est une petite fille. Est-ce une petite fille? --- Oui, c'est une petite fille.

36. (*) I'll ask, Est-ce une petite fille. You answer, Non, c'est une grande fille. Est-ce une petite fille? --- Non, c'est une grande fille.

37. (*) I'll ask, Est -ce un grand garcon? And you answer, Oui, c'est un grand garcon. Est-ce un grand garcon? --- Oui, c'est un grand garcon.

38. (*) I'll ask, Est-ce un petit garcon? And you answer, Oui, c'est un petit garcon. Est-ce un petit garcon? --- Oui, c'est un petit garcon.

31	large dog standing
32	small dog standing
33	large dog standing
34	large girl standing
35	small girl standing
36	large girl standing
37	large boy standing
38	small boy standing

39. (*) I'll ask, Est-ce un petit garcon? And you answer, Non, c'est un grand garcon. Est-ce un petit garcon? --- Non, c'est un grand garcon.

40. (*) Answer the question: Est-ce une petite fille? -- Oui, c'est une petite fille.

41. (*) Est-ce une grande fille? --- Non, c'est une petite fille.

42. (*) Est-ce un petit garcon? --- Oui, c'est un petit garcon.

43. (*) Est-ce un grand garcon? --- Oui, c'est un grand garcon.

44. (*) Est-ce un petit chien? --- Oui, c'est un petit chien.

45. (*) Est-ce un petit chien? --- Non, c'est un grand chien.

46. Answer the question. (*) Est-ce un petit chien? --- Oui, c'est un petit chien.

47. (*) Est-ce une petite fille? --- Non, c'est un petit chien.

48. (*) Est-ce une petite fille? --- Oui, c'est une petite fille.

49. (*) Est-ce une grande fille? --- Non, c'est une petite fille.

50. (*) Est-ce une grande fille? --- Oui, c'est une grande fille.

51. (*) Est-ce un grand garcon? --- Oui, c'est un grand garcon.

52. (*) Est-ce un grand garcon? --- Non, c'est un petit garcon.

39	large boy standing
40	small girl standing
41	small girl standing
42	small boy standing
43	large boy standing
44	small dog standing
45	large dog standing
46	small dog standing
47	small dog standing
48	small girl standing
49	small girl standing
50	large girl standing
51	large boy standing
52	small boy standing

53. (*) Est-ce une grande fille? --- Non, c'est une petite fille.	53	small girl standing
54. (*) Est-ce un grand chien? --- Non, c'est un petit garcon.	54	small boy standing
55. (*) Est-ce un petit chien? --- Oui, c'est un petit chien.	55	small dog standing
56. (*) Est-ce un petit garcon? --- Non, c'est un petit chien.	56	small dog standing
57. (*) Est-ce une grande fille? --- Oui, c'est une grande fille.	57	large girl standing
58. (*) Est-ce un petit chien? --- Non, c'est un petit garcon.	58	small boy standing
59. (*) Est-ce une grande fille? --- Non, c'est un grand chien.	59	large dog standing
60. (*) Est-ce un petit garcon? --- Oui, c'est un petit garcon.	60	small boy standing

Speaking Frames: LESSON IV

1. Look at the picture on the screen. (*) Try to say just what I say. Garcon ---. Le...garcon ---. Le garcon ---.	1	large boy standing
2. Once again as soon as the picture comes on the screen. (*) --- Le garcon.	2	large boy standing
3. (*) Try to say just what I say. Chien ---. Le...chien ---. Le chien ---.	3	large dog standing
4. Once again as soon as the picture comes on the screen. (*) --- Le chien.	4	large dog standing
5. Try this again. (*) --- Le garcon.	5	large boy standing
6. This again. (*) --- Le chien.	6	large dog standing

7. This again. (*) --- Le garcon.

8. (*) --- Le chien.

9. Try to say just what I say. (*) Fille ---. La...fille ---. La fille ---.

10. Once again as soon as the picture comes on the screen. (*) --- La fille.

11. Try this again. (*) --- Le chien.

12. This once again. (*) --- La fille.

13. Once again. (*) --- La fille.

14. This again. (*) --- Le garcon.

15. (*) --- La fille.

16. Look at the picture on the screen. (*) Try to say just what I say. La fille ---.

17. (*) Petite ---. Est...petite ---. La fille...est petite ---. La fille est petite ---.

18. Once again as soon as the picture comes on the screen. (*) --- La fille est petite.

19. Try to say just what I say. (*) Le chien ---.

20. (*) Petit ---. Est...petit ---. Le chien...est petit ---. Le chien est petit ---.

21. Once again as soon as the picture comes on the screen. (*) --- Le chien est petit.

7	large boy standing
8	large dog standing
9	large girl standing
10	large girl standing
11	large dog standing
12	large girl standing
13	large girl standing
14	large boy standing
15	large girl standing
16	large girl standing
17	small girl standing
18	small girl standing
19	large dog standing
20	small dog standing
21	small dog standing

22. Try this again. (*) --- La fille est petite.

23. This again. (*) --- Le chien est petit.

24. This again. (*) --- La fille est petite.

25. Try to say just what I say. (*) Le garcon ---.

26. (*) Petit ---. Est...petit ---. Le garcon...est petit ---. Le garcon est petit ---.

27. Once more as soon as the picture comes on the screen. (*) --- Le garcon est petit.

28. Try this again. (*) --- La fille est petite.

29. (*) --- Le garcon est petit.

30. (*) --- La fille est petite.

31. Try to say just what I say. (*) Le garcon est petit. ---

32. (*) Grand ---. Est...grand ---. Le garcon...est grand ---. Le garcon est grand ---.

33. Once again as soon as the picture comes on the screen. (*) --- Le garcon est grand.

34. Try to say just what I say. (*) La fille est petite. ---

35. (*) Grande ---. Est...grande ---. La fille...est grande ---. La fille est grande ---.

36. Once again as soon as the picture comes on the screen. (*) --- La fille est grande.

22	small girl standing
23	small dog standing
24	small girl standing
25	large boy standing
26	small boy standing
27	small boy standing
28	small girl standing
29	small boy standing
30	small girl standing
31	small boy standing
32	large boy standing
33	large boy standing
34	small girl standing
35	large girl standing
36	large girl standing

37. Try this again. (*) --- Le chien est petit.

38. This once more. (*) --- Le chien est grand.

39. Speak just as soon as the picture comes on the screen. (*) --- Le chien est grand.

40. (*) --- La fille est petite.

41. (*) --- La fille est grande.

42. (*) --- Le garcon est petit.

43. (*) --- Le garcon est grand.

44. (*) --- La fille est petite.

45. (*) --- La fille est grande.

46. Look at the picture on the screen. (*) I'll ask a question: Est-ce que la fille est petite? The answer is, Oui, la fille est petite. Try to answer the question: Est-ce que la fille est petite? --- Oui, la fille est petite.

47. Look at this picture. (*) I'll ask, Est-ce que la fille est grande? The answer is, Non, la fille est petite. Answer the question: Est-ce que la fille est grande? --- Non, la fille est petite.

48. Answer the question. (*) Est-ce que la fille est grande? --- Oui, la fille est grande.

49. Look at this picture. (*) Est-ce que le chien est grand? The answer is, Oui, le chien est grand. Answer the question: Est-ce que le chien est grand? --- Oui, le chien est grand.

37	small dog standing
38	large dog standing
39	large dog standing
40	small girl standing
41	large girl standing
42	small boy standing
43	large boy standing
44	small girl standing
45	large girl standing
46	small girl standing
47	small girl standing
48	large girl standing
49	large dog standing

50. Look at this picture. (*) I'll ask, Est-ce que le chien est grand? The answer is, Non, le chien est petit. Answer the question: Est-ce que le chien est grand? --- Non, le chien est petit.

51. Answer this question. (*) Est-ce que le chien est petit? --- Oui, le chien est petit.

52. Answer the question. (*) Est-ce que le chien est grand? --- Non, le chien est petit.

53. (*) Est-ce que la fille est grande? --- Oui, la fille est grande.

54. Answer the question. (*) Est-ce que le chien est grand? --- Non, le chien est petit.

55. (*) Est-ce que le chien est petit? --- Oui, le chien est petit.

56. (*) Est-ce que le garcon est petit? --- Oui, le garcon est petit.

57. (*) Est-ce que le garcon est grand? --- Non, le garcon est petit.

58. (*) Est-ce que la fille est grande? --- Oui, la fille est grande.

59. (*) Est-ce que le chien est petit? --- Non, le chien est grand.

60. (*) Est-ce que le chien est petit? --- Oui, le chien est petit.

Speaking Frames: LESSON V

1. Look at the picture on the screen. (*) Try to say just what I say. La fille... ---

2. (*) est assise ---. La fille...est assise ---. La fille est assise ---.

50	small dog standing
51	small dog standing
52	small dog standing
53	large girl standing
54	small dog standing
55	small dog standing
56	small boy standing
57	small boy standing
58	large girl standing
59	large dog standing
60	small dog standing
1	large girl standing
2	large girl sitting

3. Try it again as soon as the picture comes on the screen. (*) --- La fille est assise.	3	large girl sitting
4. Try to say just what I say. (*) Le garcon... ---	4	large boy standing
5. (*) est assis ---. Le garcon...est assis ---. Le garcon est assis ---.	5	large boy sitting
6. Once again as soon as the picture comes on the screen. (*) --- Le garcon est assis.	6	large boy sitting
7. Try to say just what I say. (*) La fille est assise ---.	7	large girl sitting
8. Try it again. (*) --- La fille est assise.	8	large girl sitting
9. Try this again. (*) Le garcon est assis ---.	9	large boy sitting
10. Try it again as soon as the picture comes on the screen. (*) --- You should have said, Le garcon est assis.	10	large boy sitting
11. Try to say just what I say. (*) Le chien... ---	11	large dog standing
12. (*) est assis ---. Le chien...est assis ---. Le chien est assis ---.	12	large dog sitting
13. Try it again as soon as the picture comes on the screen. (*) --- Le chien est assis.	13	large dog sitting
14. Try this again. (*) La fille est assise ---.	14	large girl sitting
15. Once again as soon as the picture comes on the screen. (*) --- La fille est assise.	15	large girl sitting
16. Try to say just what I say. (*) Le garcon est assis ---.	16	large boy sitting
17. Once again as soon as the picture comes on the screen. (*) --- Le garcon est assis.	17	large boy sitting

18. Try to say just what I say. (*) Debout ---. Est...debout ---. Le garcon...est debout ---. Le garcon est debout ---.

19. Once again as soon as the picture comes on the screen. (*) --- Le garcon est debout.

20. Try to say just what I say. (*) La fille est assise ---.

21. Once again. (*) --- La fille est assise.

22. Try to say just what I say. (*) Est debout ---. La fille...est debout ---. La fille est debout ---.

23. Once again. (*) --- La fille est debout.

24. Try to say just what I say. (*) Le chien est assis ---.

25. (*) Est debout ---. Le chien...est debout ---. Le chien est debout ---.

26. Once again. (*) --- Le chien est debout.

27. Say just what I say. (*) La fille est assise ---.

28. (*) La fille est debout ---.

29. (*) Le garcon est assis ---.

30. (*) Le garcon est debout ---.

31. Try to say just what I say. (*) La fille est assise ---. Oui, la fille est assise ---. I'll ask a question and you answer by saying, Oui, la fille est assise. Est-ce que la fille est assise? --- Oui, la fille est assise.

18	large boy standing
19	large boy standing
20	large girl sitting
21	large girl sitting
22	large girl standing
23	large girl standing
24	large dog sitting
25	large dog standing
26	large dog standing
27	large girl sitting
28	large girl standing
29	large boy sitting
30	large boy standing
31	large girl sitting

32. Try to say just what I say. (*) La fille est debout ---. Oui, la fille est debout ---. I'll ask a question and you answer by saying, Oui, la fille est debout. Est-ce que la fille est debout? --- Oui, la fille est debout.

33. Try to say just what I say. (*) Le chien est assis ---. I'll ask a question and you answer by saying, Non, le chien est assis. Est-ce que le chien est debout? --- Non, le chien est assis.

34. Say just what I say. (*) Le chien est assis ---. Oui, le chien est assis ---. Answer the question: Est-ce que le chien est assis? --- Oui, le chien est assis.

35. Try to say just what I say. (*) La fille est assise ---. Oui, la fille est assise ---. Answer the question: Est-ce que la fille est assise? --- Oui, la fille est assise.

36. Try to say just what I say. (*) La fille est debout ---. Answer the question by saying, Non, la fille est debout. Est-ce que la fille est assise? --- Non, la fille est debout.

37. Say just what I say. (*) La fille est debout ---. Oui, la fille est debout ---. Answer the question: Est-ce que la fille est debout? --- Oui, la fille est debout.

38. Answer the question. (*) Est-ce que la fille est debout? --- Non, la fille est assise.

39. Answer the question. (*) Est-ce que le garcon est debout? --- Oui, le garcon est debout.

40. Answer the question. (*) Est-ce que le chien est assis? --- Non, le chien est debout.

32	large girl standing
33	large dog sitting
34	large dog sitting
35	large girl sitting
36	large girl standing
37	large girl standing
38	large girl sitting
39	large boy standing
40	large dog standing

41. (*) Est-ce que le chien est debout? --- Oui, le chien est debout.

42. Say just what I say. (*) La petite fille est assise. --- Answer the question: Est-ce que la petite fille est assise? --- Oui, la petite fille est assise.

43. (*) Answer the question: Est-ce que la petite fille est assise? --- Non, la petite fille est debout.

44. Say just what I say. (*) Le petit garcon est assis. --- Answer the question: Est-ce que le petit garcon est assis? --- Oui, le petit garcon est assis.

45. Say just what I say. (*) Le petit garcon est debout. --- Answer the question: Est-ce que le petit garcon est debout? --- Oui, le petit garcon est debout.

46. Try to say just what I say. (*) La petite fille est assise. ---

47. (*) Le petit chien est assis. ---

48. Once again as soon as the picture comes on the screen. (*) --- Le petit chien est assis.

49. Try this again. (*) --- La petite fille est assise.

50. Try to say just what I say. (*) Le grand chien est debout. ---

51. (*) La grande fille est debout. ---

52. (*) Le grand garcon est debout. ---

53. Try to say just what I say. (*) C'est une petite fille ---. Oui, c'est une petite fille ---. Answer the question: Est-ce une petite fille? --- Oui, c'est une petite fille.

41	large dog standing
42	small girl sitting
43	small girl standing
44	small boy sitting
45	small boy standing
46	small girl sitting
47	small dog sitting
48	small dog sitting
49	small girl sitting
50	large dog standing
51	large girl standing
52	large boy standing
53	small girl standing

54. Answer the question: Est-ce que la petite fille est assise? --- Oui, la petite fille est assise.

55. Try to say just what I say. (*) La petite fille est debout. --- Answer the question: Est-ce que la petite fille est assise? --- Non, la petite fille est debout.

56. Try to say just what I say. (*) Le petit garcon est assis. --- Answer the question: Est-ce que le petit garcon est debout? --- Non, le petit garcon est assis.

57. Try to say just what I say. (*) La petite fille est assise. --- Answer the question: Est-ce que la petite fille est assise? --- Oui, la petite fille est assise.

58. Try to say just what I say. (*) C'est un petit garcon. --- Answer the question: Est-ce un petit chien? --- Non, c'est un petit garcon.

59. Say just what I say. (*) C'est une petite fille. --- Est-ce un grand garcon? --- Non, c'est une petite fille.

60. Try to say just what I say. (*) La petite fille est assise. --- Answer the question: Est-ce que la petite fille est assise? --- Oui, la petite fille est assise.

54	small girl sitting
55	small girl standing
56	small boy sitting
57	small girl sitting
58	small boy standing
59	small girl standing
60	small girl sitting

Listening Comprehension Frames:

LESSON I

1. Look at the first page of your booklet. This page has a row of boxes. Now look at the picture on the screen. (*) The picture on the screen has a number. Copy the number in the first box. --- The picture on the screen has a number 3. You should have copied a number 3 in the first box.

2. Try it again. (*) Copy the number of this picture in the next box. --- You should have copied a number 1 in the second box.

3. Once more, copy the number just as soon as the picture comes on the screen. (*) --- You should have copied the number 2 in the next box.

4. Once again. (*) --- Number 3.

5. Copy the number just as soon as the picture comes on the screen. (*) --- Number 2.

6. (*) --- Number 3.

7. (*) --- Number 1.

8. (*) --- Number 3.

9. (*) --- Number 2.

10. Copy the number just as soon as the picture comes on the screen. (*) --- Number 1.

1			large dog standing 3
2	large girl standing 1		
3		large boy standing 2	
4			large girl standing 3
5		large boy standing 2	
6			large girl standing 3
7	large girl standing 1		
8			large dog standing 3
9		large boy standing 2	
10	large girl standing 1		

11. (*) --- Number 2.

12. (*) --- Number 1.

13. (*) --- Number 2.

14. (*) --- Number 2.

15. (*) --- Number 1.

16. Turn to the next page in your booklet. Look at the top row of boxes. Now look at the picture on the screen. (*) When I say un garcon, copy the number of this picture in the first box. Un garcon. --- You should have copied a number 2 in the first box.

17. Try it again. (*) Un garcon. --- You should have copied a number 2 in the next box.

18. When I say une fille, copy the number of this picture in the next box. Une fille. --- You should have copied a number 3.

19. Try it again. (*) Une fille. --- Number 3.

20. (*) Un garcon. --- Number 2.

11		large girl standing 2	
12	large boy standing 1		
13		large girl standing 2	
14		large girl standing 2	
15	large dog standing 1		
16		large boy standing 2	
17		large boy standing 2	
18			large girl standing 3
19		large boy standing 2	large girl standing 3
20		large boy standing 2	large girl standing 3

21. (*) Une fille. --- Number 3.

22. (*) Un garcon. --- Number 2.

23. (*) When I say un chien, copy the number of this picture. Un chien. --- Number 1.

24. Once again. (*) Un chien. --- Number 1.

25. (*) Une fille. --- Number 3.

26. (*) Un chien. --- Number 1.

27. (*) Un garcon. --- Number 2.

28. (*) Un chien. --- Number 1.

29. (*) Une fille. --- Number 3.

30. (*) Un chien. --- Number 1.

21		large boy standing 2	large girl standing 3
22		large boy standing 2	large girl standing 3
23	large dog standing 1		
24	large dog standing 1		large girl standing 3
25	large dog standing 1		large girl standing 3
26	large dog standing 1	large boy standing 2	
27	large dog standing 1	large boy standing 2	large girl standing 3
28	large dog standing 1	large boy standing 2	large girl standing 3
29	large dog standing 1	large boy standing 2	large girl standing 3
30	large dog standing 1	large boy standing 2	large girl standing 3

31. Look at the next row of boxes. Now look at the picture on the screen. (*) Copy the number of the picture that goes with what I say. Une fille. --- You should have copied the number 1.

32. Try it again. (*) Une fille. --- Number 3.

33. Try this. (*) Un chien. --- Number 2.

34. Try it again. (*) Un chien. --- Number 3.

35. (*) Une fille. --- Number 1.

36. (*) Un chien. --- Number 2.

37. (*) Une fille. --- Number 3.

38. (*) Un garcon. --- Number 2.

39. Once again. (*) Un garcon. --- Number 3.

40. (*) Un chien --- Number 2.

31	large girl standing 1		
32		large dog standing 2	large girl standing 3
33		large dog standing 2	
34			large dog standing 3
35	large girl standing 1		large dog standing 3
36		large dog standing 2	large girl standing 3
37		large dog standing 2	large girl standing 3
38		large boy standing 2	
39	large girl standing 1		large boy standing 3
40		large dog standing 2	large girl standing 3

41. (*) Un garcon. --- Number 3.

42. (*) Une fille. --- Number 1.

43. (*) Un garcon. --- Number 3.

44. (*) Un chien. --- Number 2.

45. (*) Un garcon. --- Number 1.

46. Look at the next row of boxes. Now look at the picture on the screen. (*) What I say will tell you what you see. C'est un chien. Copy the number of the picture that goes with what I say. C'est un chien. --- You should have copied the number 3.

47. Try it again. (*) C'est un chien. --- Number 1.

48. (*) C'est un garcon. --- Number 1.

49. Try it again. (*) C'est un garcon. --- Number 2.

50. (*) C'est un chien. --- Number 1.

41	large girl standing 1		large boy standing 3
42	large girl standing 1	large boy standing 2	large dog standing 3
43	large dog standing 1	large girl standing 2	large boy standing 3
44	large boy standing 1	large dog standing 2	large girl standing 3
45	large boy standing 1	large dog standing 2	large girl standing 3
46			large dog standing 3
47	large dog standing 1	large boy standing 2	
48	large boy standing 1		
49	large dog standing 1	large boy standing 2	
50	large dog standing 1	large boy standing 2	

51. (*) C'est un garcon. ---
Number 2.

52. (*) C'est un chien. ---
Number 1.

53. (*) C'est une fille. ---
Number 3.

54. (*) C'est une fille. ---
Number 1.

55. (*) C'est un garcon. ---
Number 2.

56. (*) C'est une fille. ---
Number 1.

57. (*) C'est un chien. ---
Number 3.

58. (*) C'est une fille. ---
Number 2.

59. (*) C'est un garcon. ---
Number 1.

60. (*) C'est une fille. ---
Number 3.

51	large dog standing 1	large boy standing 2	large girl standing 3
52	large dog standing 1	large boy standing 2	large girl standing 3
53			large girl standing 3
54	large girl standing 1		large boy standing 3
55		large boy standing 2	large girl standing 3
56	large girl standing 1	large boy standing 2	large dog standing 3
57	large girl standing 1	large boy standing 2	large dog standing 3
58	large dog standing 1	large girl standing 2	large boy standing 3
59	large boy standing 1	large dog standing 2	large girl standing 3
60	large dog standing 1	large boy standing 2	large girl standing 3

61. Look at the next row of boxes. Now look at the screen. (*) Copy the number of the picture that goes with what I say. C'est un garcon. --- You should have copied the number 2.

62. Try this. (*) C'est une fille. --- Number 3.

63. (*) C'est un garcon. --- Number 2.

64. (*) C'est une fille. --- Number 1.

65. (*) C'est un chien. --- Number 2.

66. (*) C'est un garcon. --- Number 1.

67. (*) C'est un chien. --- Number 2.

68. (*) C'est une fille. --- Number 3.

69. (*) C'est un chien. --- Number 2.

70. (*) C'est un garcon. --- Number 1.

61		large boy standing 2	
62		large boy standing 2	large girl standing 3
63		large boy standing 2	large girl standing 3
64	large girl standing 1		large dog standing 3
65	large boy standing 1	large dog standing 2	large girl standing 3
66	large boy standing 1	large dog standing 2	large girl standing 3
67	large boy standing 1	large dog standing 2	large girl standing 3
68	large dog standing 1	large boy standing 2	large girl standing 3
69	large boy standing 1	large dog standing 2	large girl standing 3
70	large boy standing 1	large dog standing 2	large girl standing 3

71. (*) C'est une fille. ---
Number 3.

72. (*) C'est un chien. ---
Number 1.

73. (*) C'est un garcon. ---
Number 2.

74. (*) C'est une fille. ---
Number 3.

75. (*) C'est un chien. ---
Number 1.

Listening Comprehension Frames:

LESSON II

1. Turn to the next page in your booklet. Find the top row of boxes. Now look at the screen. (*) Copy the number of the word that goes with what I say. Non ---. You should have copied the number 3.

2. Try it again. (*) Non. ---
You should have copied the number 3.

3. Once more. (*) Non. ---
You should have copied the number 3.

4. (*) Copy the number of the word that goes with what I say. Oui. ---
You should have copied the number 1.

71	large boy standing 1	large dog standing 2	large girl standing 3
72	large dog standing 1	large boy standing 2	large girl standing 3
73	large dog standing 1	large boy standing 2	large girl standing 3
74	large boy standing 1	large dog standing 2	large girl standing 3
75	large dog standing 1	large girl standing 2	large boy standing 3
1			non 3
2			non 3
3	oui 1		non 3
4	oui 1		

5. Once again. (*) Oui. --- Number 1.

6. Once more. (*) Oui. --- Number 1.

7. Try this again. (*) Non. --- Number 3.

8. (*) Non. --- Number 3.

9. (*) Oui. --- Number 1.

10. (*) Oui. --- Number 1.

11. Copy the number of the word that goes with what I say. (*) Non. --- Number 3.

12. (*) Oui. --- Number 1.

13. (*) Oui. --- Number 1.

14. (*) Non. --- Number 3.

5	oui 1		
6	oui 1		non 3
7			non 3
8	oui 1		non 3
9	oui 1		
10	oui 1		non 3
11	oui 1		non 3
12	oui 1		non 3
13	oui 1		non 3
14	oui 1		non 3

15. (*) Oui. --- Number 1.

16. Start the next row of boxes. Copy the number of the picture that goes with what I say. (*) C'est une fille. --- You should have copied the number 2.

17. Look at the picture. (*) Copy the number of the word that answers this question: Est-ce une fille. --- You should have copied the number 1. Oui, c'est une fille.

18. Try it again. (*) Est-ce une fille? --- Number 1. Oui, c'est une fille.

19. Try this. (*) Est-ce une fille? --- You should have copied the number 3. Non, c'est un chien.

20. Copy the number of the picture that goes with what I say. (*) C'est un chien. --- Number 2.

21. (*) Est-ce un chien? --- Number 1. Oui, c'est un chien.

22. (*) Est-ce un chien? --- Number 1. Oui, c'est un chien.

23. (*) Est-ce un chien? --- Number 3. Non, c'est une fille.

24. (*) Est-ce une fille? --- Number 1. Oui, c'est une fille.

15	oui 1		non 3
16		large girl standing 2	
17	oui 1	large girl standing	non 3
18	oui 1	large girl standing	non 3
19	oui 1	large dog standing	non 3
20		large dog standing 2	
21	oui 1	large dog standing	non 3
22	oui 1	large dog standing	non 3
23	oui 1	large girl standing	non 3
24	oui 1	large girl standing	non 3

25. (*) Est-ce une fille? --- Number 3. Non, c'est un chien.

26. (*) Est-ce un chien? --- Number 1. Oui, c'est un chien.

27. (*) C'est un garcon. --- Number 2.

28. (*) Est-ce un garcon? --- Number 1. Oui, c'est un garcon.

29. (*) Est-ce un garcon? --- Number 1. Oui, c'est un garcon.

30. (*) Est-ce un garcon? --- Number 3. Non, c'est une fille.

31. Start the next row of boxes. (*) Est-ce une fille? --- Number 1. Oui, c'est une fille.

32. (*) Est-ce une fille? --- Number 1. Oui, c'est une fille.

33. (*) Est-ce une fille? --- Number 3. Non, c'est un garcon.

34. (*) Est-ce un garcon? --- Number 1. Oui,c'est un garcon.

25	oui 1	large dog standing	non 3
26	oui 1	large dog standing	non 3
27		large boy standing 2	
28	oui 1	large boy standing	non 3
29	oui 1	large boy standing	non 3
30	oui 1	large girl standing	non 3
31	oui 1	large girl standing	non 3
32	oui 1	large girl standing	non 3
33	oui 1	large boy standing	non 3
34	oui 1	large boy standing	non 3

35. (*) Est-ce un garcon? --- Number 3. Non, c'est une fille.

36. (*) Est-ce une fille? --- Number 1. Oui, c'est une fille.

37. (*) Est-ce une fille? --- Number 3. Non, c'est un garcon.

38. (*) Est-ce un garcon? --- Number 1. Oui, c'est un garcon.

39. (*) Est-ce un garcon? --- Number 3. Non, c'est un chien.

40. (*) Est-ce un chien? --- Number 1. Oui, c'est un chien.

41. (*) Est-ce un chien? --- Number 3. Non, c'est un garcon.

42. (*) Est-ce un garcon? --- Number 1. Oui, c'est un garcon.

43. (*) Est-ce un garcon? --- Number 3. Non, c'est un chien.

44. (*) Est-ce un chien? --- Number 1. Oui, c'est un chien.

35	oui 1	large girl standing	non 3
36	oui 1	large girl standing	non 3
37	oui 1	large boy standing	non 3
38	oui 1	large boy standing	non 3
39	oui 1	large dog standing	non 3
40	oui 1	large dog standing	non 3
41	oui 1	large boy standing	non 3
42	oui 1	large boy standing	non 3
43	oui 1	large dog standing	non 3
44	oui 1	large dog standing	non 3

45. (*) Est-ce un chien? ---
Number 3. Non, c'est une fille.

46. Start the next row of boxes. (*)
Est-ce une fille? --- Number 1.
Oui, c'est une fille.

47. (*) Est-ce une fille? ---
Number 3. Non, c'est un chien.

48. (*) Est-ce une fille? ---
Number 3. Non, c'est un garcon.

49. (*) Est-ce une fille? ---
Number 1. Oui, c'est une fille.

50. (*) Est-ce un garcon? ---
Number 1. Oui, c'est un garcon.

51. (*) Est-ce un garcon? ---
Number 3. Non, c'est une fille.

52. (*) Est-ce un garcon? ---
Number 3. Non, c'est un chien.

53. (*) Est-ce un garcon? ---
Number 1. Oui, c'est un garcon.

54. (*) Est-ce un chien? ---
Number 1. Oui, c'est un chien.

45	oui 1	large girl standing	non 3
46	oui 1	large girl standing	non 3
47	oui 1	large dog standing	non 3
48	oui 1	large boy standing	non 3
49	oui 1	large girl standing	non 3
50	oui 1	large boy standing	non 3
51	oui 1	large girl standing	non 3
52	oui 1	large dog standing	non 3
53	oui 1	large boy standing	non 3
54	oui 1	large dog standing	non 3

55. (*) Est-ce une fille? ---
Number 3. Non, c'est un garcon.

56. (*) Est-ce un garcon? ---
Number 3. Non, c'est un chien.

57. (*) Est-ce un garcon? ---
Number 1. Oui, c'est un garcon.

58. (*) Est-ce une fille? ---
Number 1. Oui, c'est une fille.

59. (*) Est-ce une fille? ---
Number 3. Non, c'est un garcon.

60. (*) Est-ce une fille? ---
Number 3. Non, c'est un chien.

Listening Comprehension Frames:

LESSON III

1. Look at the next row of boxes. Now look at the picture on the screen. (*) Copy the number that goes with what I say. C'est un chien. --- You should have copied the number 2.

2. Try this. (*) C'est un petit chien. --- You should have copied the number 3.

3. Try it again. (*) C'est un petit chien. --- Number 3.

55	oui 1	large boy standing	non 3
56	oui 1	large dog standing	non 3
57	oui 1	large boy standing	non 3
58	oui 1	large girl standing	non 3
59	oui 1	large boy standing	non 3
60	oui 1	large dog standing	non 3
1		large dog standing 2	
2			small dog standing 3
3	large dog standing 1		small dog standing 3

4. (*) C'est une fille. --- Number 2.

5. (*) C'est une petite fille. --- Number 1.

6. Try it again. (*) C' est une petite fille. --- You should have copied the number 2.

7. (*) C'est un petit chien. --- Number 1.

8. (*) C'est un petit chien. --- Number 3.

9. (*) C'est une petite fille. --- Number 2.

10. (*) C'est une petite fille.. --- Number 3.

11. (*) C'est un petit chien. --- Number 1.

12. (*) C'est une petite fille. --- Number 3.

13. (*) C'est un garcon. --- Number 2.

4		large girl standing 2	
5	small girl standing 1		
6		small girl standing 2	large girl standing 3
7	small dog standing 1		
8		large dog standing 2	small dog standing 3
9		small girl standing 2	
10	small dog standing 1		small girl standing 3
11	small dog standing 1		small girl standing 3
12	small dog standing 1		small girl standing 3
13		large boy standing 2	

14. (*) C'est un petit garcon. --- Number 3.

15. (*) C'est un petit garcon. --- Number 2.

16. Begin the next row of boxes. (*) C'est un petit garcon. --- Number 2.

17. (*) C'est un grand garcon. --- Number 2.

18. (*) C'est un grand garcon. --- Number 3.

19. (*) C'est un petit garcon. --- Number 1.

20. (*) C'est un grand garcon. --- Number 3.

21. (*) C'est un petit garcon. --- Number 1.

22. (*) C'est une grande fille. --- Number 2.

23. (*) C'est une grande fille. --- Number 1.

14			small boy standing 3
15	large boy standing 1	small boy standing 2	
16		small boy standing 2	
17		large boy standing 2	
18	small boy standing 1		large boy standing 3
19	small boy standing 1		large boy standing 3
20	small boy standing 1		large boy standing 3
21	small boy standing 1		large boy standing 3
22		large girl standing 2	
23	large girl standing 1		small girl standing 3

24. (*) C'est une petite fille. --- Number 3.

25. (*) C'est une grande fille. --- Number 1.

26. (*) C'est un petit chien. --- Number 2.

27. (*) C'est un grand chien. --- Number 3.

28. (*) C'est un grand chien. --- Number 1.

29. (*) C'est un petit chien. --- Number 2.

30. (*) C'est un grand chien. --- Number 3.

31. Begin the next row of boxes. Look at the picture on the screen. (*) Answer this question: Est-ce un grand chien? --- Oui, c'est un grand chien. You should have copied the number 1.

32. Try this. (*) Est-ce un petit chien? --- Oui, c'est un petit chien. Number 1.

33. (*) Est-ce un petit chien? --- Non, c'est un grand chien. Number 3.

24	large girl standing 1		small girl standing 3
25	large girl standing 1		small girl standing 3
26	large girl standing 1	small boy standing 2	large dog standing 3
27	small girl standing 1	small boy standing 2	large dog standing 3
28	large dog standing 1	large boy standing 2	small dog standing 3
29	small boy standing 1	small dog standing 2	large boy standing 3
30	large girl standing 1	small dog standing 2	large dog standing 3
31	oui 1	large dog standing	non 3
32	oui 1	small dog standing	non 3
33	oui 1	large dog standing	non 3

34. (*) Est-ce une grande fille?
--- Oui, c'est une grande fille.
Number 1.

35. (*) Est-ce une petite fille?
--- Oui, c'est une petite fille.
Number 1.

36. (*) Est-ce une petite fille?
--- Non, c'est une grande fille.
Number 3.

37. (*) Est-ce un grand garcon?
--- Oui, c'est un grand garcon.
Number 1.

38. (*) Est-ce un petit garcon?
--- Oui, c'est un petit garcon.
Number 1.

39. (*) Est-ce un petit garcon?
--- Non, c'est un grand garcon.
Number 3.

40. (*) Est-ce une petite fille?
--- Oui, c'est une petite fille.
You should have copied the number 1.

41. (*) Est-ce une grande fille?
--- Non, c'est une petite fille.
Number 3.

42. (*) Est-ce un petit garcon?
--- Oui, c'est un petit garcon.
Number 1.

43. (*) Est-ce un grand garcon?
---Oui, c'est un grand garcon. You should have copied the number 1.

34	oui 1	large girl standing	non 3
35	oui 1	small girl standing	non 3
36	oui 1	large girl standing	non 3
37	oui 1	large boy standing	non 3
38	oui 1	small boy standing	non 3
39	oui 1	large boy standing	non 3
40	oui 1	small girl standing	non 3
41	oui 1	small girl standing	non 3
42	oui 1	small boy standing	non 3
43	oui 1	large boy standing	non 3

44. (*) Est-ce un petit chien? --- Oui, c'est un petit chien. Number 1.

45. (*) Est-ce un petit chien? ---Non, c'est un grand chien. Number 3.

46. Begin the next row of boxes. (*) Answer the question: Est-ce un petit chien? --- Oui, c'est un petit chien. Number 1.

47. (*) Est-ce une petite fille? --- Non, c'est un petit chien. You should have copied the number 3.

48. (*) Est-ce une petite fille? --- Oui, c'est une petite fille. You should have copied the number 1.

49 . (*) Est-ce une grande fille? --- Non, c'est une petite fille. Number 3.

50. (*) Est-ce une grande fille? --- Oui, c'est une grande fille. Number 1.

51. (*) Est-ce un grand garcon? --- Oui, c'est un grand garcon. Number 1.

52. (*) Est-ce un grand garcon? --- Non, c'est un petit garcon. Number 3.

53. (*) Est-ce une grande fille? --- Non, c'est une petite fille. Number 3.

44	oui 1	small dog standing	non 3
45	oui 1	large dog standing	non 3
46	oui 1	small dog standing	non 3
47	oui 1	small dog standing	non 3
48	oui 1	small girl standing	non 3
49	oui 1	small girl standing	non 3
50	oui 1	large girl standing	non 3
51	oui 1	large boy standing	non 3
52	oui 1	small boy standing	non 3
53	oui 1	small girl standing	non 3

54. (*) Est-ce un grand chien?
--- Non, c'est un petit garcon.
Number 3.

55. (*) Est-ce un petit chien?
--- Oui, c'est un petit chien.
Number 1.

56. (*) Est-ce un petit garcon?
--- Non, c'est un petit chien.
Number 3.

57. (*) Est-ce une grande fille?
--- Oui, c'est une grande fille.
Number 1.

58. (*) Est-ce un petit chien?
--- Non, c'est un petit garcon.
Number 3.

59. (*) Est-ce une grande fille?
--- Non, c'est un grand chien.
Number 3.

60. (*) Est-ce un petit garcon?
--- Oui, c'est un petit garcon.
Number 1.

Listening Comprehension Frames:

LESSON IV

1. Look at the screen. (*) Copy the number of the picture that goes with what I say. Le garcon. --- You should have copied the number 3.

2. Once again. (*) Le garcon.
--- Number 1.

54	oui 1	small boy standing	non 3
55	oui 1	small dog standing	non 3
56	oui 1	small dog standing	non 3
57	oui 1	large girl standing	non 3
58	oui 1	small boy standing	non 3
59	oui 1	large dog standing	non 3
60	oui 1	small boy standing	non 3
1			large boy standing 3
2	large boy standing 1	large dog standing 2	

3. Copy the number before I tell you the number. (*) Le chien. --- Number 1.

4. (*) Le chien. --- Number 3.

5. (*) Le garcon. --- Number 1.

6. (*) Le chien. --- Number 3.

7. (*) Le garcon. --- Number 2.

8. (*) Le chien. --- Number 3.

9. (*) La fille. --- Number 1.

10. (*) La fille. --- Number 2.

11. (*) Le chien. --- Number 3.

12. (*) La fille. --- Number 1.

3	large dog standing 1		
4		large boy standing 2	large dog standing 3
5	large boy standing 1		large dog standing 3
6	large boy standing 1		large dog standing 3
7		large boy standing 2	large dog standing 3
8	large girl standing 1	large boy standing 2	large dog standing 3
9	large girl standing 1		
10		large girl standing 2	large dog standing 3
11		large girl standing 2	large dog standing 3
12	large girl standing 1	large dog standing 2	large boy standing 3

13. (*) La fille. --- Number 2.

14. (*) Le garcon. --- Number 1.

15. (*) La fille. --- Number 3.

16. Copy the number before I tell you what number you should have copied. (*) La fille. --- Number 3.

17. (*) La fille est petite. --- Number 1.

18. (*) La fille est petite. --- You should have copied the number 2.

19. (*) Le chien. --- Number 3.

20. (*) Le chien est petit. --- Number 3.

21. (*) Le chien est petit. --- Number 1.

22. (*) La fille est petite. --- Number 3.

13		large girl standing 2	large dog standing 3
14	large boy standing 1	large dog standing 2	large girl standing 3
15	large boy standing 1	large dog standing 2	large girl standing 3
16			large girl standing 3
17	small dog standing 1		
18		small girl standing 2	large girl standing 3
19			large dog standing 3
20			small dog standing 3
21	small dog standing 1	large dog standing 2	
22	small dog standing 1		small girl standing 3

23. (*) Le chien est petit. --- Number 1.

24. (*) La fille est petite. --- Number 3.

25. (*) Le garcon. --- Number 2.

26. (*) Le garcon est petit. --- Number 3.

27. (*) Le garcon est petit. --- Number 2.

28. (*) La fille est petite. --- Number 1.

29. (*) Le garcon est petit. --- Number 3.

30. (*) La fille est petite. --- Number 2.

31. Copy the number before I tell you what number you should have copied. (*) Le garcon est petit. --- Number 1.

32. (*) Le garcon est grand. --- Number 3.

23	small dog standing 1		small girl standing 3
24	small dog standing 1		small girl standing 3
25		large boy standing 2	
26			small boy standing 3
27	large boy standing 1	small boy standing 2	
28	small girl standing 1		small boy standing 3
29	small girl standing 1		small boy standing 3
30		small girl standing 2	small boy standing 3
31	small boy standing 1		
32	small boy standing 1		large boy standing 3

33. (*) Le garcon est grand. --- Number 2.

34. (*) La fille est petite. --- Number 1.

35. (*) La fille est grande. --- Number 3.

36. (*) La fille est grande. --- Number 2.

37. (*) Le chien est petit. --- Number 3.

38. (*) Le chien est grand. --- Number 1.

39. (*) Le chien est grand. --- Number 2.

40. (*) La fille est petite. --- Number 1.

41. (*) La fille est grande. --- Number 3.

42. (*) Le garcon est petite. --- Number 3.

33	small girl standing 1	large boy standing 2	
34	small girl standing 1	large boy standing 2	
35		small girl standing 2	large girl standing 3
36	small girl standing 1	large girl standing 2	
37			small dog standing 3
38	large dog standing 1		small dog standing 3
39	small girl standing 1	large dog standing 2	small dog standing 3
40	small girl standing 1		small boy standing 3
41	small girl standing 1	small dog standing 2	large girl standing 3
42	large boy standing 1	small girl standing 2	small boy standing 3

43. (*) Le garcon est grand. --- Number 1.

44. (*) La fille est petite. --- Number 1.

45. (*) La fille est grande. --- Number 1.

46. Look at the picture. (*) I'll ask a question: Est-ce que la fille est petite? The answer is, Oui. When I ask a question, copy the number of the answer. Est-ce que la fille est petite? --- You should have copied the number 1, Oui.

47. (*) Copy the number of the word that answers this question: Est-ce que la fille est grande? --- Non. Number 3.

48. (*) Est-ce que la fille est grande? --- Oui. Number 1.

49. (*) Est-ce que le chien est grand? --- Oui. Number 1.

50. (*) Est-ce que le chien est grand? --- Non. Number 3.

51. (*) Est-ce que le chien est petit? --- Oui, le chien est petit. Number 1.

52. (*) Est-ce que le chien est grand? --- Non, le chien est petit. Number 3.

43	large boy standing 1	small girl standing 2	small boy standing 3
44	small girl standing 1		large girl standing 3
45	large girl standing 1	small girl standing 2	small boy standing 3
46	oui 1	small girl standing	non 3
47	oui 1	small girl standing	non 3
48	oui 1	large girl standing	non 3
49	oui 1	large dog standing	non 3
50	oui 1	small dog standing	non 3
51	oui 1	small dog standing	non 3
52	oui 1	small dog standing	non 3

53. (*) Est-ce que la fille est grande? --- Oui, la fille est grande. Number 1.

54. (*) Est-ce que le chien est grand? --- Non, le chien est petit. Number 3.

55. (*) Est-ce que le chien est petit? --- Oui, le chien est petit. Number 1.

56. (*) Est-ce que le garcon est petit? --- Oui, le garcon est petit. Number 1.

57. (*) Est-ce que le garcon est grand? --- Non, le garcon est petit. Number 3.

58. (*) Est-ce que la fille est grande? --- Oui, la fille est grande. Number 1.

59. (*) Est-ce que le chien est petit? --- Oui, le chien est petit. Number 1.

60. (*) Est-ce que le chien est petit? --- Non, le chien est grand. Number 3.

Listening Comprehension Frames:

LESSON V

1. Begin the next row of boxes. Look at the screen. (*) Copy the number of the picture that goes with what I say. La fille. --- Number 3.

53	oui 1	large girl standing	non 3
54	oui 1	small dog standing	non 3
55	oui 1	small dog standing	non 3
56	oui 1	small boy standing	non 3
57	oui 1	small boy standing	non 3
58	oui 1	large girl standing	non 3
59	oui 1	large dog standing	non 3
60	oui 1	small dog standing	non 3
1			large girl standing 3

2. (*) La fille est assise. --- Number 1.

3. (*) La fille est assise. --- Number 1.

4. (*) Le garcon. --- Number 2.

5. (*) Le garcon est assis. --- Number 3.

6. (*) Le garcon est assis. --- Number 3.

7. (*) La fille est assise. --- Number 1.

8. (*) La fille est assise. --- Number 2.

9. (*) Le garcon est assis. --- Number 1.

10. (*) Le chien. --- Number 2.

11. (*) Le chien est assis. --- Number 1.

2	large girl sitting 1		
3	large girl sitting 1		large girl standing 3
4		large boy standing 2	
5			large boy sitting 3
6		large boy standing 2	large boy sitting 3
7	large girl sitting 1		large girl standing 3
8		large girl sitting 2	large girl standing 3
9	large boy sitting 1		large boy standing 3
10		large dog standing 2	
11	large dog sitting 1		

12. (*) Le chien est assis. --- Number 2.

13. (*) Le chien est assis. --- Number 3.

14. (*) La fille est assise. --- Number 1.

15. (*) La fille est assise. --- Number 1.

16. Begin the next row of boxes. (*) Le garcon est assis. --- Number 2.

17. (*) Le garcon est assis. --- Number 3.

18. (*) Le garcon est debout. --- Number 1.

19. (*) Le garcon est debout. --- Number 1.

20. (*) La fille est assise. --- Number 1.

21. (*) La fille est assise. --- Number 2.

12		large dog sitting 2	large dog standing 3
13	large dog standing 1		large dog sitting 3
14	large girl sitting 1		
15	large girl sitting 1		large girl standing 3
16		large boy sitting 2	
17	large boy standing 1		large boy sitting 3
18	large boy standing 1		
19	large boy standing 1		large boy sitting 3
20	large girl sitting 1		
21		large girl sitting 2	large girl standing 3

22. (*) La fille est debout. --- Number 3.

23. (*) La fille est debout. --- Number 2.

24. (*) Le chien est assis. --- Number 3.

25. (*) Le chien est debout. --- Number 1.

26. (*) Le chien est debout. --- Number 3.

27. (*) La fille est assise. --- Number 3.

28. (*) La fille est debout. --- Number 1.

29. (*) Le garcon est assis. --- Number 2.

30. (*) Le garcon est debout. --- Number 3.

31. Begin the next row of boxes. Look at the picture. (*) Copy the number of the word that answers this question: Est-ce que la fille est assise? --- Oui, la fille est assise. You should have copied the number 1.

22			large girl standing 3
23	large girl sitting 1	large girl standing 2	
24			large dog sitting 3
25	large dog standing 1		
26		large dog sitting 2	large dog standing 3
27			large girl sitting 3
28	large girl standing 1		large girl sitting 3
29	large girl standing 1	large boy sitting 2	large boy standing 3
30	large dog standing 1	large girl sitting 2	large boy standing 3
31	oui 1	large girl sitting	non 3

32. Once again. (*) Est-ce que la fille est debout? --- Oui, la fille est debout. Number 1.

33. (*) Est-ce que le garcon est assis? --- Non, le garcon est debout. Number 3.

34. (*) Est-ce que le chien est assis? --- Oui, le chien est assis. Number 1.

35. (*) Est-ce que la fille est assise? --- Oui, la fille est assise. Number 1.

36. (*) Est-ce que la fille est assise? --- Non, la fille est debout. Number 3.

37. (*) Est-ce que la fille est debout? --- Oui, la fille est debout. Number 1.

38. (*) Est-ce que la fille est debout? --- Non, la fille est assise. --- Number 3.

39. (*) Est-ce que le garcon est debout? --- Oui, le garcon est debout. Number 1.

40. (*) Est-ce que le petit garcon est debout? --- Non, le petit garcon est assis. Number 3.

41. (*) Est-ce que la petite fille est debout? --- Oui, la petite fille est debout. Number 1.

32	oui 1	large girl standing	non 3
33	oui 1	large boy standing	non 3
34	oui 1	large dog sitting	non 3
35	oui 1	large girl sitting	non 3
36	oui 1	large girl standing	non 3
37	oui 1	large girl standing	non 3
38	oui 1	large girl sitting	non 3
39	oui 1	large boy standing	non 3
40	oui 1	small boy sitting	non 3
41	oui 1	small girl standing	non 3

42. (*) Est-ce que la petite fille est assise? --- Oui, la petite fille est assise. Number 1.

43. (*) Est-ce que la petite fille est assise? --- Non, la petite fille est debout. Number 3.

44. (*) Est-ce que le petit chien est assis? --- Oui, le petit chien est assis. Number 1.

45. (*) Est-ce que le petit garcon est debout? --- Oui, le petit garcon est debout. Number 1.

46. Begin the next row of boxes. (*) Copy the number of the picture that goes with what I say. La petite fille est assise. --- Number 3.

47. (*) Le petit chien est assis. --- Number 2.

48. (*) Le petit chien est assis. --- Number 3.

49. (*) La petite fille est assise. --- Number 2.

50. (*) Le grand chien est debout. --- Number 3.

51. (*) La petite fille est debout. --- Number 2.

42	oui 1	small girl sitting	non 3
43	oui 1	small girl standing	non 3
44	oui 1	small dog sitting	non 3
45	oui 1	small boy standing	non 3
46	small girl standing 1		small girl sitting 3
47		small dog sitting 2	
48	small dog standing 1		small dog sitting 3
49	small girl standing 1	small girl sitting 2	
50	large dog sitting 1		large dog standing 3
51	small dog sitting 1	small girl standing 2	small girl sitting 3

52. (*) Le grand garcon est debout. --- Number 1.

53. (*) Copy the number of the word that answers this question: Est-ce une petite fille? --- Oui, c'est une petite fille. Number 1.

54. (*) Est-ce que la petite fille est assise? --- Oui, la petite fille est assise. Number 1.

55. (*) Est-ce que la petite fille est assise --- Non, la petite fille est debout. Number 3.

56. (*) Est-ce que le petit garcon est debout? --- Non, le petit garcon est assis. Number 3.

57. (*) Est-ce que la petite fille est assise? --- Oui, la petite fille est assise. Number 1.

58. (*) Est-ce un petit chien? --- Non, c'est un petit garcon. Number 3.

59. (*) Est-ce un grand garcon? --- Non, c'est une petite fille. Number 3.

60. (*) Est-ce que la petite fille est assise? --- Oui, la petite fille est assise. Number 1.

52	large boy standing 1	small boy sitting 2	small girl sitting 3
53	oui 1	small girl standing	non 3
54	oui 1	small girl sitting	non 3
55	oui 1	small girl standing	non 3
56	oui 1	small boy sitting	non 3
57	oui 1	small girl sitting	non 3
58	oui 1	small boy sitting	non 3
59	oui 1	small girl standing	non 3
60	oui 1	small girl sitting	non 3

Listening Comprehension Test

1. Find the first row of boxes. Now look at the pictures on the screen. (*) Copy the number of the picture that goes with what I say. La fille est petite. ---

2. Try it again. (*) C'est un petit garcon. ---

3. Once again. (*) Le garcon est grand. ---

4. (*) C'est un petit chien. ---

5. (*) La fille est grande. ---

6. (*) Le chien est petit. ---

7. (*) C'est une petite fille. ---

8. (*) Le garcon est petit. ---

1	small dog standing 1	small girl standing 2	small boy standing 3
2	small boy standing 1	small girl standing 2	small dog standing 3
3	large girl standing 1	large dog standing 2	large boy standing 3
4	large girl standing 1	small dog standing 2	large dog standing 3
5	small girl standing 1	large boy standing 2	large girl standing 3
6	large girl standing 1	small dog standing 2	large dog standing 3
7	small boy standing 1	large dog standing 2	small girl standing 3
	large girl standing 4	large boy standing 5	small dog standing 6
8	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6

9. (*) C'est un grand chien. ---

10. (*) C'est une grande fille. ---

11. (*) Le garcon est grand. ---

12. (*) C'est une petite fille. ---

13. (*) Le chien est grand. ---

9	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
10	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
11	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
12	small boy standing 1	large dog standing 2	small girl standing 3
	large girl standing 4	large boy standing 5	small dog standing 6
13	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6

14. (*) La fille est petite. ---

15. (*) C'est un grand garcon. ---

16. Begin the next row of boxes. (*) Copy the number of the word which answers this question: Est-ce que le garcon est grand? ---

17. Answer this question. (*) Est-ce que la petite fille est assise? ---

18. (*) Est-ce un grand garcon? ---

19. (*) Est-ce que la fille est petite? ---

20. (*) Est-ce que la petite fille est debout? ---

21. (*) Est-ce un grand chien? ---

14	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
15	small boy standing 1	large dog standing 2	small girl standing 3
	large girl standing 4	large boy standing 5	small dog standing 6
16	oui 1	small boy standing	non 3
17	oui 1	small girl sitting	non 3
18	oui 1	large dog standing	non 3
19	oui 1	large girl standing	non 3
20	oui 1	small girl sitting	non 3
21	oui 1	large dog standing	non 3

22. (*) Est-ce que le grand garcon est debout? ---

23. (*) Est-ce que la grande fille est assise? ---

24. (*) Est-ce un petit garcon? ---

25. (*) Est-ce que le garcon est assis? ---

26. (*) Est-ce une petite fille? ---

27. (*) Est-ce que le petit garcon est assis? ---

28. (*) Est-ce que la fille est debout? ---

29. (*) Est-ce un petit garcon? ---

30. (*) Est-ce que la grande fille est debout? ---

22	oui 1	large boy standing	non 3
23	oui 1	large girl sitting	non 3
24	oui 1	small girl standing	non 3
25	oui 1	large boy standing	non 3
26	oui 1	small girl standing	non 3
27	oui 1	small boy standing	non 3
28	oui 1	large girl standing	non 3
29	oui 1	small dog standing	non 3
30	oui 1	large girl sitting	non 3

31. Begin the next row of boxes.
(*) C'est un petit garcon. ---

32. (*) Est-ce que la fille est grande? ---

33. (*) Est-ce un grand chien? ---

34. (*) La fille est petite. ---

35. (*) C'est un grand chien. ---

36. (*) Le petit garcon est assis. ---

31	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
32	oui 1	large girl standing	non 3
33	oui 1	large boy standing	non 3
34	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
35	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
36	large boy standing 1	small boy sitting 2	small girl sitting 3

37. (*) La petite fille est debout. ---

38. (*) Est-ce un petit garcon? ---

39. (*) Le chien est grand. ---

40. (*) Est-ce que le garcon est assis? ---

41. (*) C'est une petite fille. ---

42. (*) Est-ce que le chien est debout? ---

37	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
38	oui 1	small dog standing	non 3
39	small boy standing 1	large dog standing 2	small girl standing 3
	large girl standing 4	large boy standing 5	small dog standing 6
40	oui 1	large boy standing	non 3
41	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
42	oui 1	large dog standing	non 3

43. (*) Le garcon est grand. ---

44. (*) C'est une petite fille. ---

45. (*) La petite fille est debout. ---

46. Begin the last row of boxes.
(*) C'est une grande fille. ---

47. (*) Est-ce une petite fille? ---

48. (*) C'est un petit chien. ---

43	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
44	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
45	small dog sitting 1	small girl standing 2	small girl sitting 3
46	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
47	oui 1	small girl standing	non 3
48	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6

49. (*) Est-ce que la petite fille est assise? ---

50. (*) Le chien est grand. ---

51. (*) Est-ce que la petite fille est assise? ---

52. (*) Le chien est assis. ---

53. (*) C'est une fille. ---

54. (*) Est-ce que le garcon est debout? ---

55. (*) C'est une grande fille. ---

56. (*) Est-ce un petit chien? ---

49	oui 1	small girl standing	non 3
50	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
51	oui 1	small girl sitting	non 3
52	large dog sitting 1	large girl sitting 2	large boy standing 3
53	small boy standing 1	small dog standing 2	small girl standing 3
54	oui 1	large boy standing	non 3
55	small boy standing 1	large dog standing 2	small girl standing 3
	large girl standing 4	large boy standing 5	small dog standing 6
56	oui 1	small girl standing	non 3

57. (*) La fille est petite. ---

58. (*) C'est un petit garcon. ---

59. (*) Le chien est grand. ---

60. (*) C'est une grande fille.---

57	large girl standing 1	small girl standing 2	small boy standing 3
58	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6
59	large girl standing 1	small dog standing 2	large dog standing 3
60	large boy standing 1	small dog standing 2	large girl standing 3
	small girl standing 4	small boy standing 5	large dog standing 6

Speaking Test

1. When the picture comes on the screen tell what you see by saying: C'est un garcon or C'est une fille or C'est un chien. Try it now. Speak as soon as the picture comes on the screen. (*) ---

2. Try this. (*) ---

3. Speak as soon as the picture comes on the screen. (*) ---

4. (*) ---

5. Speak as soon as the picture comes on the screen. (*) ---

6. (*) ---

7. Speak as soon as the picture comes on the screen. (*) ---

8. (*) ---

9. (*) ---

10. (*) I'll ask a question: Est-ce un chien? And you answer by saying, Oui, c'est un chien. Est-ce un chien? ---

11. (*) I'll ask: Est-ce une fille? And you answer, Non, c'est un garcon. Est-ce une fille? ---

12. Answer this question. (*) Est-ce une fille? ---

13. (*) Est-ce un garcon? ---

14. (*) Est-ce un garcon? ---

15. (*) Est-ce une fille? ---

1	large girl standing
2	large boy standing
3	large dog standing
4	large boy standing
5	large dog standing
6	large girl standing
7	large dog standing
8	large girl standing
9	large boy standing
10	large dog standing
11	large boy standing
12	large girl standing
13	large boy standing
14	large dog standing
15	large girl standing

16. (*) Est-ce un chien? ---

17. (*) Est-ce un garcon? ---

18. When the next picture comes on the screen tell me what you see by saying: C'est un petit garcon or C'est un petit chien or C'est une petite fille. Speak as soon as the picture comes on the screen. (*) ---

19. Once again. (*) ---

20. Speak as soon as the picture comes on the screen. (*) ---

21. (*) ---

22. When the next picture comes on the screen tell what you see by saying: C'est un grand chien or C'est un grand garcon or C'est une grande fille. Try it now. (*) ---

23. Speak as soon as the picture comes on the screen. (*) ---

24. Say what you see as soon as the picture comes on the screen. (*) ---

25. (*) ---

26. (*) ---

27. (*) ---

28. (*) ---

29. (*) ---

30. (*) I'll ask: Est-ce un petit garcon? And you answer, Oui, c'est un petit garcon. Est-ce un petit garcon? ---

16	large boy standing
17	large girl standing
18	small dog standing
19	small dog standing
20	small boy standing
21	small girl standing
22	large boy standing
23	large dog standing
24	large girl standing
25	small boy standing
26	large girl standing
27	small girl standing
28	large dog standing
29	small boy standing
30	small boy standing

31. Answer this question. (*) Est-ce un petit chien? ---	31	small girl standing
32. Answer this question. (*) Est-ce un grand garcon? ---	32	large boy standing
33. (*) Est-ce une grande fille? ---	33	large dog standing
34. (*) Est-ce un petit garcon? ---	34	small dog standing
35. (*) Est-ce un grand garcon? ---	35	large boy standing
36. When the next picture comes on the screen tell what you see by saying: Le garcon est petit or Le chien est petit or La fille est petite. Speak as soon as the picture comes on the screen. (*) ---	36	small dog standing
37. Speak as soon as the next picture comes on the screen. (*) ---	37	small girl standing
38. (*) ---	38	small boy standing
39. When the next picture comes on the screen tell what you see by saying: Le garcon est grand or Le chien est grand or La fille est grande. Speak as soon as the picture comes on the screen. (*) ---	39	large boy standing
40. Speak as soon as the picture comes on the screen. (*) ---	40	large girl standing
41. Tell what you see as soon as the next picture comes on the screen. (*) ---	41	small girl standing
42. (*) ---	42	large dog standing
43. (*) ---	43	large girl standing
44. (*) ---	44	small dog standing
45. (*) I'll ask: Est-ce que le garcon est grand? And you answer, Oui, le garcon est grand. Est-ce que le garcon est grand? ---	45	large boy standing

46. Answer this question. (*) Est-ce que le chien est grand? ---

47. (*) Est-ce que la fille est petite? ---

48. When the next picture comes on the screen tell what you see by saying: La fille est assise or Le garcon est assis. (*) ---

49. Speak as soon as the picture comes on the screen. (*) ---

50. (*) ---

51. When the next picture comes on the screen tell what you see by saying: Le petit garcon est assis or La petite fille est assise. (*) ---

52. Speak as soon as the picture comes on the screen. (*) ---

53. (*) ---

54. (*) ---

55. (*) ---

56. When the next picture comes on the screen tell what you see by saying: La petite fille est debout or Le petit garcon est debout. (*) ---

57. Speak as soon as the picture comes on the screen. (*) ---

58. (*) ---

59. (*) ---

60. (*) ---

46	small dog standing
47	large girl standing
48	large boy sitting
49	large girl sitting
50	large dog sitting
51	small girl sitting
52	small boy sitting
53	large girl sitting
54	small dog sitting
55	large boy sitting
56	small girl standing
57	small boy standing
58	large girl sitting
59	small boy sitting
60	large dog standing

61. Tell what you see as soon as the picture comes on the screen. (*) ---

62. (*) ---

63. (*) ---

64. (*) I'll ask: Est-ce que la petite fille est debout? And you answer, Oui, la petite fille est debout. Est-ce que la petite fille est debout? ---

65. Answer this question. (*) Est-ce que la petite fille est debout? ---

66. (*) Est-ce que le grand chien est assis? ---

67. (*) Est-ce une grande fille? ---

68. (*) Est-ce un petit chien? ---

69. (*) Est-ce que le grand garcon est assis? ---

70. Tell what you see as soon as the picture comes on the screen. (*) ---

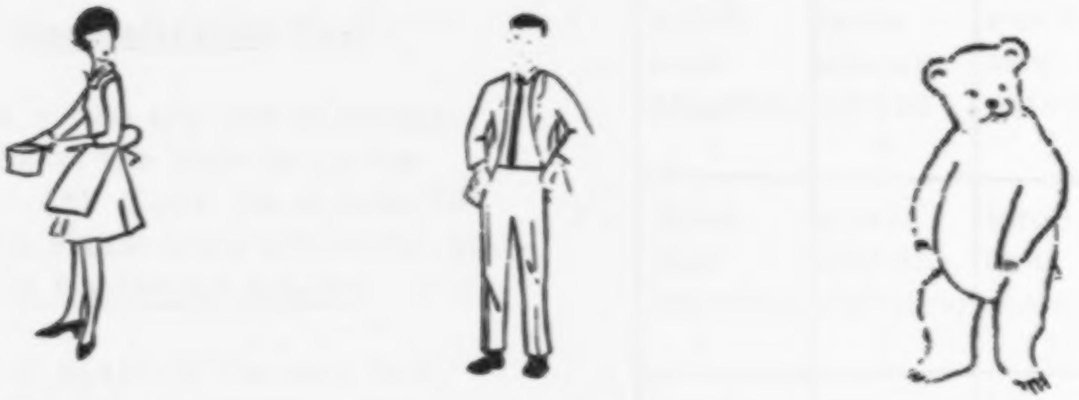
71. Try this. (*) ---

72. (*) ---

73. (*) ---

74. (*) ---

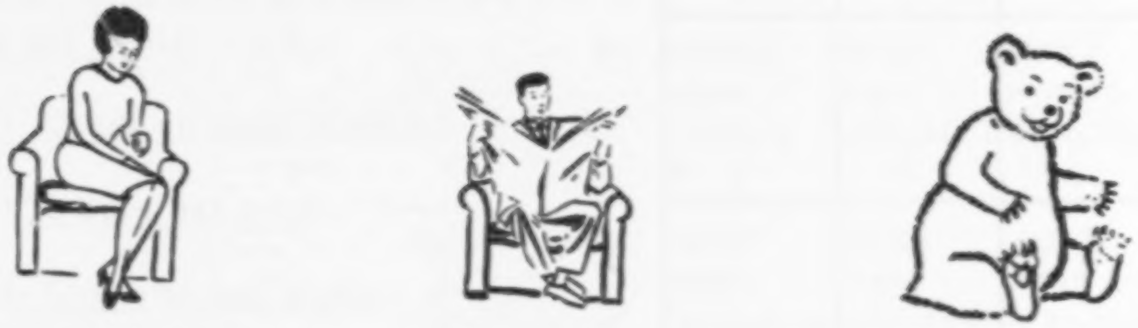
61	large boy standing
62	small girl sitting
63	large dog sitting
64	small girl standing
65	small girl sitting
66	large dog sitting
67	large boy standing
68	large dog standing
69	large boy sitting
70	large girl sitting
71	small boy standing
72	large dog sitting
73	large girl standing
74	small girl sitting



large woman standing

large man standing

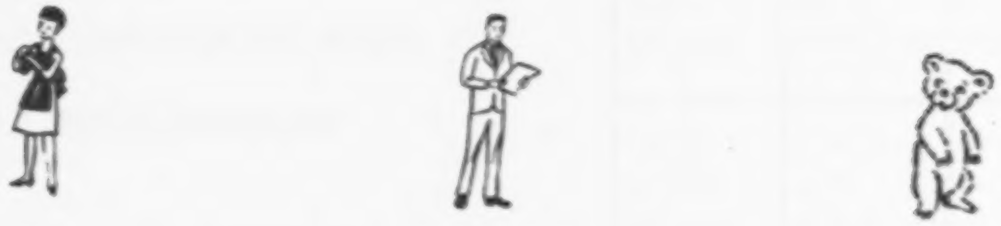
large bear standing



large woman sitting

large man sitting

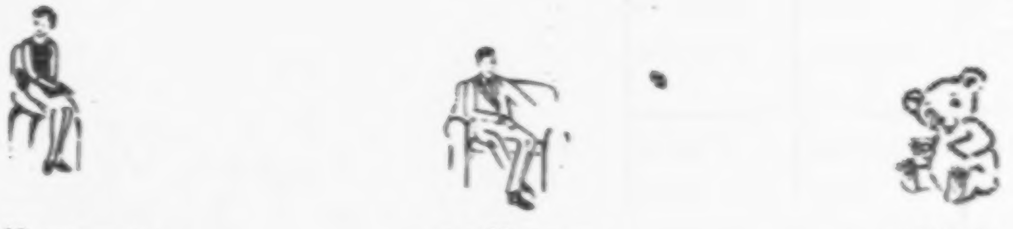
large bear sitting



small woman standing

small man standing

small bear standing



small woman sitting

small man sitting

small bear sitting

Figure 12 Pictorial Stimuli for Generalization
Test of Experiment I

Generalization Test

1. Look at the top row of boxes. Now look at the picture on the screen. (*) Copy the number of the picture that goes with what you hear. La femme est assise. ---

2. Try it again in the next box. (*) La femme est petite. ---

3. Copy the number of the picture that goes with what you hear. (*) L'ours est assis. ---

4. (*) C'est un petit homme. ---

5. (*) L'ours est petit. ---

6. (*) L'homme est assis. ---

7. (*) La grande femme est assise. ---

8. (*) Le grand ours est assis. ---

9. (*) La petite femme est assise. ---

10. (*) La grande femme est debout. ---

1	small bear standing 1	large woman sitting 2	small man standing 3
2	large man standing 1	small woman standing 2	large bear standing 3
3	small woman standing 1	large man standing 2	large bear sitting 3
4	small man sitting 1	large man standing 2	large woman standing 3
5	large bear standing 1	large man standing 2	small bear standing 3
6	small man sitting 1	large man standing 2	small woman standing 3
7	large woman sitting 1	small man standing 2	small bear standing 3
8	small woman sitting 1	large bear sitting 2	small man sitting 3
9	small man standing 1	large bear standing 2	small woman sitting 3
10	small man sitting 1	small woman sitting 2	large woman standing 3

11. (*) Le grand ours est debout. ---

12. (*) Le petit homme est debout. ---

13. (*) Le petit ours est debout. ---

14. Begin the next row of boxes. (*) Voila une femme assise. ---

15. (*) Voici une petite femme. ---

16. (*) L'ours est assis parterre. ---

17. (*) Le petit homme est assis dans un fauteuil. ---

18. (*) Le petit ours est mignon. ---

19. (*) Voici un homme assis. ---

20. (*) Voici une grande femme assise. ---

11	small woman standing 1	large bear standing 2	small bear standing 3
12	small bear sitting 1	large man sitting 2	small man standing 3
13	small woman standing 1	small bear standing 2	small man standing 3
14	small bear standing 1	large woman sitting 2	small man standing 3
15	large man standing 1	small woman standing 2	large bear standing 3
16	small woman standing 1	large man standing 2	large bear sitting 3
17	small man sitting 1	large man standing 2	large woman standing 3
18	large bear standing 1	large man standing 2	small bear standing 3
19	small man sitting 1	large man standing 2	small woman standing 3
20	large woman sitting 1	small man standing 2	small bear standing 3

21. (*) Le grand ours est assis parterre. ---

22. (*) Voici une petite femme assise. ---

23. (*) La grande femme cuisine debout. ---

24. (*) Voici un grand ours debout. ---

25. (*) Le petit homme est debout avec des papiers dans ses mains. ---

26. (*) Voici un petit ours debout. ---

27. Begin the next row of boxes. (*) C'est une petite femme. ---

28. (*) C'est un grand ours. ---

29. (*) C'est une grande femme. ---

30. (*) L'homme est debout. ---

21	small woman sitting 1	large bear sitting 2	small man sitting 3
22	small man standing 1	large bear standing 2	small woman sitting 3
23	small man sitting 1	small woman sitting 2	large woman standing 3
24	small woman standing 1	large bear standing 2	small bear standing 3
25	small bear sitting 1	large man sitting 2	small man standing 3
26	small woman standing 1	small bear standing 2	small man standing 3
27	large bear sitting 1	large man sitting 2	small woman standing 3
28	small woman standing 1	small man standing 2	large bear standing 3
29	small man standing 1	large woman standing 2	small bear sitting 3
30	large man sitting 1	large bear sitting 2	small man standing 3

31. (*) La femme est debout. ---

32. (*) C'est un petit ours. ---

33. (*) Le petit ours est debout. ---

34. (*) La petite femme est assise. ---

35. (*) Le grand homme est debout. ---

36. (*) Le petit ours est assis. ---

37. (*) La grande femme est assise. ---

38. (*) La petite femme est debout. ---

39. (*) Le grand homme est assis. ---

40. Begin the next row of boxes.
(*) La petite femme essuie la vaisselle debout. ---

31	small man sitting 1	small woman standing 2	small woman sitting 3
32	large bear sitting 1	large man standing 2	small bear sitting 3
33	small bear standing 1	large woman sitting 2	large man sitting 3
34	large man standing 1	small bear standing 2	small woman sitting 3
35	small woman sitting 1	large man standing 2	small bear standing 3
36	small bear sitting 1	large woman standing 2	large bear standing 3
37	large woman standing 1	large man standing 2	large woman sitting 3
38	large bear sitting 1	small woman standing 2	large woman standing 3
39	large man sitting 1	large bear standing 2	large woman standing 3
40	large bear sitting 1	large man sitting 2	small man standing 3

41. (*) Voila un grand ours. ---

42. (*) Voila une grande femme. ---

43. (*) L'homme est debout avec des papiers dans ses mains. ---

44. (*) La petite femme essuie la vaiselle debout. ---

45. (*) Le petit ours est mignon. ---

46. (*) Voici un petit ours debout. ---

47. (*) La petite femme est assise sur une chaise. ---

48. (*) Voici un grand homme debout. ---

49. (*) Voici un petit ours assis. ---

50. (*) La grande femme est assise dans un fauteuil. ---

41	small woman standing 1	small man standing 2	large bear standing 3
42	small man standing 1	large woman standing 2	small bear sitting 3
43	large man sitting 1	large bear sitting 2	small man standing 3
44	small man sitting 1	small woman standing 2	small woman sitting 3
45	large bear sitting 1	large man standing 2	small bear sitting 3
46	small bear standing 1	large woman sitting 2	large man sitting 3
47	small man standing 1	small bear standing [✓ 2]	small woman sitting 3
48	small woman sitting 1	large man standing 2	small bear standing 3
49	small bear sitting 1	large woman standing 2	large bear standing 3
50	large woman standing 1	large man standing 2	large woman sitting 3

51. (*) Voici une petite femme debout. ---

52. (*) Le grand homme est assis lisant un journal. ---

53. Begin the next row of boxes. (*) L'homme est debout. ---

54. (*) L'ours est debout. ---

55. (*) L'homme est petit. ---

56. (*) C'est un grand ours. ---

57. (*) C'est un grand homme. ---

58. (*) La femme est grande. ---

59. (*) Le grand homme est assis. ---

60. (*) Le petit homme est debout. ---

51	large bear sitting 1	small woman standing 2	large woman standing 3
52	large man sitting 1	large bear standing 2	large woman standing 3
53	large man standing 1	small bear sitting 2	small woman sitting 3
54	large bear standing 1	large woman sitting 2	large man sitting 3
55	small man standing 1	large woman standing 2	large bear sitting 3
56	large bear sitting 1	small woman standing 2	small bear standing 3
57	small bear sitting 1	small man sitting 2	large man sitting 3
58	small bear standing 1	large woman sitting 2	small woman sitting 3
59	small woman standing 1	small bear standing 2	large man sitting 3
60	large woman standing 1	small man standing 2	large bear standing 3

61. (*) Le petit ours est assis. ---

62. (*) Le petit homme est debout. ---

63. (*) Le petit ours est assis. ---

64. (*) Le grand homme est assis. ---

65. (*) La petite femme est assise. ---

66. Begin the last row of boxes. (*) Voici l'homme debout. ---

67. (*) Voici l'ours debout. ---

68. (*) Voila un petit homme. ---

69. (*) Voila un grand ours. ---

70. (*) Le grand homme est assis dans un fauteuil. ---

61	small woman standing 1	small bear sitting 2	large man standing 3
62	large man sitting 1	large bear sitting 2	small man standing 3
63	small bear sitting 1	large bear standing 2	large man standing 3
64	large man sitting 1	large woman standing 2	small man standing 3
65	small bear sitting 1	small man sitting 2	small woman sitting 3
66	large man standing 1	small bear sitting 2	small woman sitting 3
67	large bear standing 1	large woman sitting 2	large man sitting 3
68	small man standing 1	large woman standing 2	large bear sitting 3
69	large bear sitting 1	small woman standing 2	small bear standing 3
70	small bear sitting 1	small man sitting 2	large man sitting 3

4

71. (*) La grande femme cuisine debout. ---

72. (*) Voici un grand homme assis. ---

73. (*) Voici un petit homme debout. ---

74. (*) Le petit ours est assis parterre. ---

75. (*) Voici un petit homme debout. ---

76. (*) Voici un petit ours assis. ---

77. (*) Le grand homme est assis dans un fauteuil. ---

78. (*) Voici une petite femme assise sur une chaise. ---

71	large man sitting 1	large woman standing 2	small man standing 3
72	small woman standing 1	small bear standing 2	large man sitting 3
73	large woman standing 1	small man standing 2	large bear standing 3
74	small woman standing 1	small bear sitting 2	large man standing 3
75	large man sitting 1	large bear sitting 2	small man standing 3
76	small bear sitting 1	large bear standing 2	large man standing 3
77	small bear sitting 1	large man sitting 2	small man standing 3
78	small bear sitting 1	small man sitting 2	small woman sitting 3

APPENDIX B

PROGRAMMED MATERIALS FOR

EXPERIMENT II

Taped Narrative

Formal Discrimination Training

S_1R_1: Picture Identification
(subject sees picture - selects picture)

1. Look at your booklet. Now look at the picture on the screen. (*) Find the picture on the paper that looks just like the picture on the screen. Put your finger on the number. --- You should have your finger on the number 1.

2. Let's try it again. (*) Find the picture on the paper that looks just like the picture on the screen. Put your finger on the number. --- Number 2.

3. (*) Put your finger on the number. --- Number 1.

4. (*) Put your finger on the number. ---

5. Let's try it again. (*) --- Number 2. You should have your finger on the number 2.

6. Once again. (*) --- Number 3.

7. Put your finger on the number just as soon as the picture comes on the screen. (*) --- Number 1.

8. (*) --- Number 3.

35 mm. Slides
See Figure 11
p.   for
pictorial stimuli

1	large girl standing
2	large boy standing
3	large girl standing
4	large dog standing
5	large boy standing
6	large dog standing
7	large girl standing
8	large dog standing

9. (*) --- Number 2.

10. (*) --- Number 1.

11. (*) --- Number 3.

12. (*) --- Number 2.

S_2R_2: Echoic Responding
(subject hears word - says word)

13. (*) Now try to say just what I say. La fille ---. Try it again. La fille ---. Try this: le garcon ---. Speak loudly now and say it again: le garcon ---. La fille ---. Le garcon ---. La fille ---. Try this: le chien ---. Le chien ---. Le garcon ---. Le chien ---. La fille ---. Le chien ---. Le garcon ---. Le chien ---.

S_3R_3: Transcription
(subject sees word - writes word)

14. Turn to the next page in your booklet. This page has lines. (*) Turn the booklet around and copy what you see on the screen on the top line. ---

15. (*) Let's try it again. Copy what you see on the screen on the next line right under the top line. ---

16. (*) Now copy this on the next line. ---

17. (*) Try it again on the next line. ---

18. (*) Now copy this on the next line. ---

19. (*) Try this again on the next line. ---

20. (*) Now try this again on the next line. ---

21. (*) Try this. ---

22. (*) Try it again on the next line. ---

9	large boy standing
10	large girl standing
11	large dog standing
12	large boy standing
13	blank
14	la fille
15	la fille
16	le garcon
17	le garcon
18	la fille
19	le garcon
20	la fille
21	le chien
22	le chien

23. (*) Try this again on the next line. ---

24. (*) Copy this again. ---

25. (*) Look carefully at the screen.

26. (*) Write what you saw in the next space. ---

27. (*) This is what you should have written.

28. (*) Look at the screen again.

29. (*) Write what you saw in the next space. ---

30. (*) This is what you should have written.

31. Let's try it again. (*) Look at the screen carefully.

32. (*) Write what you saw. ---

33. (*) This is what you should have written.

34. Let's try it one more time. (*) Look at the screen carefully.

35. (*) Write what you saw. ---

36. (*) And here's what you should have written.

23	le garcon
24	le chien
25	la fille
26	blank
27	la fille
28	le chien
29	blank
30	le chien
31	le garcon
32	blank
33	le garcon
34	le chien
35	blank
36	le chien

Cross-Discrimination Training

S_1R_2: Speaking (Tacting)
(subject sees picture - says word)

1. Turn to the next page in your booklet. There is nothing on this page. Look at the screen. (*) When you see this picture say: le chien. ---

2. Try it again. (*) --- You should have said le chien.

3. (*) When you see this picture say: le garcon. ---

4. Try it again. (*) --- Le garcon.

5. Try this again. (*) --- Le chien.

6. Speak loudly. Say the word as soon as the picture comes on the screen. (*) --- Le garcon.

7. Try this again. (*) --- Le chien.

8. And this again. (*) --- Le garcon.

9. (*) When you see this picture say: la fille. ---

10. Try it again. (*) --- La fille.

11. Try this again. (*) --- Le garcon.

12. And this again. (*) --- La fille.

13. Speak loudly now. (*) --- La fille.

14. Try this again. (*) La fille.

15. And this once more. (*) --- La fille.

1	large dog standing
2	large dog standing
3	large boy standing
4	large boy standing
5	large dog standing
6	large boy standing
7	large dog standing
8	large boy standing
9	large girl standing
10	large girl standing
11	large boy standing
12	large girl standing
13	large girl standing
14	large dog standing
15	large girl standing

16. Try it again on the next line. (*) Le chien. ---

17. (*) Here's what you should have written.

18. (*) Le garcon. ---

19. (*) Here's what you should have written.

20. (*) Le chien. ---

21. (*) Stop writing. Here is what you should have written.

22. Once again. (*) Le chien. ---

23. (*) Here's what you should have written.

24. Try this again. (*) La fille. ---

25. (*) Stop writing. Here is what you should have written.

26. And this once more. (*) Le chien. ---

27. (*) And this is what you should have written.

16	blank
17	le chien
18	blank
19	le garcon
20	blank
21	le chien
22	blank
23	le chien
24	blank
25	la fille
26	blank
27	le chien

S_2R_3: Dictation
(subject hears word - writes word)

1. Turn to the next page in your booklet. This page has lines. (*) When you hear la fille, copy what you see on the screen on the top line. Let's try it now. La fille. ---

2. Try it again on the next line. (*) La fille. ---

3. (*) This is what you should have written.

4. (*) When you hear le garçon, copy what you see on the screen. Le garçon. ---

5. Try it again on the next line. (*) Le garçon. ---

6. Stop writing. (*) This is what you should have written. Always stop writing when a word comes on the screen.

7. (*) Write la fille. ---

8. Stop writing. (*) This is what you should have written.

9. Be ready now. (*) Le garcon. ---

10. (*) This is what you should have written.

11. (*) La fille. ---

12. (*) This is what you should have written.

13. (*) Le garcon. ---

14. (*) This is what you should have written.

15. (*) When you hear le chien, copy what you see on the screen. Le chien. ---

1	la fille
2	blank
3	la fille
4	le garcon
5	blank
6	le garcon
7	blank
8	la fille
9	blank
10	le garcon
11	blank
12	la fille
13	blank
14	le garcon
15	le chien

S_3R_2: Texting
(subject sees word - says word)

1. Turn to the next page in your booklet. This page has nothing on it. Look at the screen. (*) Speak loudly and say: le garcon. ---

2. Try it again. (*) --- Le garcon.

3. (*) Say: la fille. ---

4. Try it again. (*) --- La fille.

5. Try this again. (*) --- Le garcon. You should have said le garcon.

6. Be ready to say the word. (*) --- La fille.

7. (*) --- Le garcon.

8. (*) --- La fille.

9. (*) Say: le chien. ---

10. Try it again. (*) --- Le chien.

11. Try this again. (*) --- La fille.

12. (*) --- Le chien.

13. (*) --- Le chien.

14. (*) --- Le garcon.

15. (*) --- Le chien.

1	le garcon
2	le garcon
3	la fille
4	la fille
5	le garcon
6	la fille
7	le garcon
8	la fille
9	le chien
10	le chien
11	la fille
12	le chien
13	le chien
14	le garcon
15	le chien

S_3R_1: Reading Comprehension
(subject sees word - selects picture)

1. Turn to the next page in your white booklet. Look at the screen. (*) Put your finger on the number 1 on the paper in front of you. --- The first picture goes with what is on the screen.

2. Try it again. (*) Put your finger on the number that goes with what is on the screen. --- You should have your finger on the number 1.

3. (*) Put your finger on the number 2. --- The second picture goes with what is on the screen now.

4. Try it again. Put your finger on the number that goes with what is on the screen. (*) --- You should have your finger on the number 2.

5. Try this again. (*) --- You should have your finger on the number 1.

6. (*) --- Number 2.

7. (*) --- Number 1. You should have your finger on the number 1.

8. (*) --- Number 2.

9. (*) --- Put your finger on the number 3. The third picture goes with what is on the screen now.

10. Try it again. Put your finger on the number that goes with what is on the screen. (*) --- You should have your finger on the number 3.

11. Try this again. (*) --- You should have your finger on the number 2.

1	la fille
2	la fille
3	le garcon
4	le garcon
5	la fille
6	le garcon
7	la fille
8	le garcon
9	le chien
10	le chien
11	le garcon

12. (*) --- Number 3.

13. Try it again. (*) --- Number 3.

14. (*) --- Number 1.

15. (*) --- Number 3.

12	le chien
13	le chien
14	la fille
15	le chien

Stimulus Exposure and Response Practice

Each of the 5 treatment groups received the following exposure and practice in addition to the discrimination training for that group:

Group I: Parts A - G
Group II: Parts A - F
Group III: Parts A - D
Group IV: Parts A - B
Group V: none

Part A

1. Turn to the next page in your booklet. This page has lines. (*) Look at the screen carefully.

2. (*) Write what you saw on the top line. ---

3. (*) Here is what you should have written.

4. (*) Watch the screen carefully.

5. (*) Write what you saw on the next line. ---

6. (*) Here is what you should have written.

7. Be ready now. (*)

8. (*) Write what you saw. ---

9. (*) Here is what you should have written.

10. (*)

11. (*) Write what you saw. ---

12. Here is what you should have written. (*)

13. (*)

14. (*) Write what you saw. ---

15. (*) Here is what you should have written.

1	le garcon
2	blank
3	le garcon
4	la fille
5	blank
6	la fille
7	le chien
8	blank
9	le chien
10	la fille
11	blank
12	la fille
13	le garcon
14	blank
15	le garcon

16. Once more. (*)

17. (*) Write what you saw. ---

18. (*) And here is what you should have written.

Part B

1. Turn to the next page in your booklet. (*) Look at the screen carefully. Find the picture on the paper that looks just like the picture on the screen.

2. (*) Put your finger on the number. --- You should have your finger on the number 1.

3. Let's try it again. Look at the screen. (*)

4. (*) Put your finger on the number. --- Number 2.

5. (*)

6. (*) --- Number 3.

7. (*)

8. (*) --- Number 2.

9. (*)

10. (*) --- Number 3.

11. (*)

16	le chien
17	blank
18	le chien
1	large girl standing
2	blank
3	large boy standing
4	blank
5	large dog standing
6	blank
7	large boy standing
8	blank
9	large dog standing
10	blank
11	large girl standing

12. (*) --- Number 1.

13. (*)

14. (*) --- Number 2.

15. (*)

16. (*) --- Number 1.

17. (*)

18. (*) --- Number 3.

19. (*)

20. (*) --- Number 2.

21. (*)

22. (*) --- Number 3.

23. (*)

24. (*) --- Number 1.

25. (*)

26. (*) --- Number 3.

12	blank
13	large boy standing
14	blank
15	large girl standing
16	blank
17	large dog standing
18	blank
19	large boy standing
20	blank
21	large dog standing
22	blank
23	large girl standing
24	blank
25	large dog standing
26	blank

27. (*)

28. (*) --- Number 2.

29. (*)

30. (*) --- Number 1.

Part C

1. Turn to the next page in your booklet. There is nothing on this page. Now try to say just what I say. Ready, le chien. ---

2. Le garcon ---

3. La fille ---

4. Le garcon ---

5. Le chien ---

6. La fille ---

7. Le garcon ---

8. La fille ---

9. Le chien ---

10. La fille ---

11. Le garcon ---

12. Le chien ---

13. Le garcon ---

14. Le chien ---

15. La fille ---

27	large boy standing
28	blank
29	large girl standing
30	blank

Part D

1. Turn to the next page in your booklet. This page has lines. (*) Look at the screen carefully.

2. (*) Copy what you saw on the top line. ---

3. (*) Here is what you should have written.

4. Watch the screen carefully. (*)

5. (*) Copy what you saw on the next line. ---

6. (*) Here is what you should have written.

7. (*)

8. (*) Copy what you saw. ---

9. (*) Here is what you should have written.

10. (*)

11. (*) Copy what you saw. ---

12. (*) Here is what you should have written.

13. (*)

14. (*) Copy what you saw. ---

15. (*) Here is what you should have written.

1	le chien
2	blank
3	le chien
4	le garcon
5	blank
6	le garcon
7	la fille
8	blank
9	la fille
10	le chien
11	blank
12	le chien
13	la fille
14	blank
15	la fille

16. (*) Once more.

17. (*) Copy what you saw. ---

18. (*) Here is what you should have written.

Part E

1. Turn to the next page in your booklet. There are lines on this page. (*) Look at the screen.

2. (*) Write what you saw on the top line. ---

3. (*) Here is what you should have written.

4. Watch the screen. (*)

5. (*) Write what you saw. ---

6. (*) Here is what you should have written.

7. (*)

8. (*) Write what you saw. ---

9. (*) Here is what you should have written.

10. Watch the screen. (*)

11. (*) Write what you saw. ---

16	le garcon
17	blank
18	le garcon
1	le chien
2	blank
3	le chien
4	le garcon
5	blank
6	le garcon
7	la fille
8	blank
9	la fille
10	le garcon
11	blank

12. (*) This is what you should have written.

13. Watch carefully. (*)

14. (*) ---

15. (*) This is what you should have written.

16. Watch carefully. (*)

17. (*) Write what you saw. ---

18. (*) And this is what you should have written.

12	le garcon
13	la fille
14	blank
15	la fille
16	le chien
17	blank
18	le chien

Part F

1. Turn to the last page of your booklet. There is nothing on this page. Try to say just what I say. La fille ---

2. Le chien ---

3. Le garcon ---

4. Le chien ---

5. Le garcon ---

6. Speak more loudly now. La fille ---

7. Le chien ---

8. La fille ---

9. Le garcon ---

10. La fille ---

11. Le chien ---

12. Le garcon ---

13. La fille ---

14. Le garcon ---

15. Le chien ---

Part G

1. Listen carefully now and try to say just what I say. Le chien ---

2. La fille ---

3. Le garcon ---

4. La fille ---

5. Le chien ---

6. Le garcon ---

7. La fille ---

8. Le garcon ---

9. Le chien ---

10. La fille ---

11. Le chien ---

12. Le garcon ---

13. Le chien ---

14. Le garcon ---

15. La fille ---

TEST I: Listening Comprehension
(subject hears word - selects picture in booklet)

1. Look at the first blue page of your large booklet. Mark an X over the number of the picture that goes with what I say. Le chien. ---

2. Turn to the next yellow page in your large booklet. Mark an X over the number of the picture that goes with what I say. La fille. ---

3. Turn to the next pink page in your large booklet. Mark an X over the number of the picture that goes with what I say. Le garcon. ---

4. When I say blue page, turn to the next blue page in your booklet. Ready, blue page. Mark an X over the number of the picture that goes with what I say. La fille. --- You should have marked an X over number 1. Don't change your answer.

5. Yellow page. Le chien. --- You should have marked an X over the number 3. If you did not, don't change your answer, just go on to the next page.

6. Pink page. Le garcon. --- Number 2. Don't ever change your answer after you've marked the number. If you have the wrong answer, just go on to the next page.

7. Blue page. Le chien. --- Number 3.

8. Yellow page. La fille. --- Number 1.

9. Pink page. Le garcon. --- Number 2.

10. Blue page. La fille. --- Number 1.

11. Yellow page. Le garcon. --- Number 2.

12. Pink page. Le chien. --- Number 3.

13. Blue page. Le garcon. --- Number 2.

14. Yellow page. La fille. --- Number 1.

15. Pink page. Le chien. --- Number 3.

16. Blue page. La fille. --- Number 1.

17. Yellow page. Le garcon. --- Number 2.

18. Pink page. Le chien. --- Number 3.

19. Blue page. Le garcon. --- Number 2.

20. Yellow page. Le chien. --- Number 3.

21. Pink page. La fille. --- Number 1.

22. Blue page. Le garcon. --- Number 2.

23. Yellow page. Le chien. --- Number 3.

24. Pink page. La fille. --- Number 1.

25. Blue page. Le chien. --- Number 3.

26. Yellow page. Le garcon. --- Number 2.

27. Pink page. La fille. --- Number 1.

28. Blue page. Le garcon. --- Number 2.

29. Yellow page. Le chien. --- Number 3.

30. Pink page. La fille. --- Number 1.

31. Blue page. Le chien. --- Number 3.

32. Yellow page. La fille. --- Number 1.

33. Pink page. Le garcon. --- Number 2.

34. Blue page. La fille. --- Number 1.

35. Yellow page. Le chien. --- Number 3.

36. Pink page. Le garcon. --- Number 2.

37. Blue page. Le chien. --- Number 3.

38. Yellow page. Le garcon. --- Number 2.

39. Pink page. La fille. --- Number 1.

40. Blue page. Le garcon. --- Number 2.

41. Yellow page. La fille. --- Number 1.

42. Pink page. Le chien. --- Number 3.

43. Blue page. La fille. --- Number 1.

44. Yellow page. Le chien. --- Number 3.

45. Pink page. Le garcon. --- Number 2.

TEST II: Writing
(subject sees picture - writes word in booklet)

1. Look at the first blue page of your small booklet. Now look at the picture on the screen. (*) Write the word you have just learned to write that goes with the picture on the screen. ---

2. Turn to the next yellow page in your small booklet. (*) Write the word that goes with the picture on the screen. ---

3. Turn to the next pink page in your small booklet. (*) Write the word that goes with the picture on the screen. ---

4. When I say 'blue page' turn to the next blue page in your small booklet. Ready, blue page. (*) Write the word that goes with the picture on the screen. --- Stop writing.

5. (*) Here is what you should have written. Don't change your answer. If you did not write what is on the screen, just go on to the next page.

6. Yellow page. (*) Write the word that goes with this picture. --- Stop writing.

7. (*) Here is what you should have written. Don't change your answer.

8. Pink page. (*) Write the word that goes with this picture. --- Stop writing.

9. (*) Here is what you should have written.

10. Blue page. Write the word just as soon as you see the picture. (*) --- Always stop writing when the answer comes on the screen.

11. Here is what you should have written.

1	large boy standing
2	large dog standing
3	large girl standing
4	large dog standing
5	le chien
6	large boy standing
7	le garcon
8	large girl standing
9	la fille
10	large boy standing
11	le garcon

12. Yellow page. Be ready to write the word. (*) ---

13. (*) Here is what you should have written.

14. Pink page. (*) ---

15. (*) Here is what you should have written.

16. Blue page. (*) ---

17. (*) Here is what you should have written.

18. Yellow page. (*) ---

19. (*)

20. Pink page. (*) ---

21. (*) Here is what you should have written.

22. Blue page. (*) ---

23. (*) Here is what you should have written.

24. Yellow page. (*) ---

25. (*)

26. Pink page. (*) ---

12	large girl standing
13	la fille
14	large dog standing
15	le chien
16	large girl standing
17	la fille
18	large dog standing
19	le chien
20	large boy standing
21	le garcon
22	large dog standing
23	le chien
24	large boy standing
25	le garcon
26	large girl standing

27. (*)
28. Blue page. (*) ---
29. (*) Here is what you should have written.
30. Yellow page. (*) ---
31. (*)
32. Pink page. (*) ---
33. (*)
34. Blue page. (*) ---
35. (*)
36. Yellow page. (*) ---
37. (*)
38. Pink page. (*) ---
39. (*)
40. Blue page. (*)
41. (*)

27	la fille
28	large dog standing
29	le chien
30	large girl standing
31	la fille
32	large boy standing
33	le garcon
34	large girl standing
35	la fille
36	large boy standing
37	le garcon
38	large dog standing
39	le chien
40	large boy standing
41	le garcon

42. Yellow page. (*) ---

43. (*)

44. Pink page. (*) ---

45. (*)

46. Blue page. (*) ---

47. (*)

48. Yellow page. (*) ---

49. (*)

50. Pink page. (*) ---

51. (*)

52. Blue page. (*) ---

53. (*)

54. Yellow page. (*) ---

55. (*)

56. Pink page. (*) ---

42	large girl standing
43	la fille
44	large dog standing
45	le chien
46	large girl standing
47	la fille
48	large dog standing
49	le chien
50	large boy standing
51	le garcon
52	large dog standing
53	le chien
54	large girl standing
55	la fille
56	large boy standing

57. (*)

58. Blue page. (*) ---

59. (*)

60. Yellow page. (*) ---

61. (*)

62. Pink page. (*) ---

63. (*)

64. Blue page. (*) ---

65. (*)

66. Yellow page. (*) ---

67. (*)

68. Pink page. (*) ---

69. (*)

70. Blue page. (*) ---

71. (*)

57	le garcon
58	large girl standing
59	la fille
60	large boy standing
61	le garcon
62	large dog standing
63	le chien
64	large boy standing
65	le garcon
66	large dog standing
67	le chien
68	large girl standing
69	la fille
70	large dog standing
71	le chien

72. Yellow page. (*) ---

73. (*)

74. Pink page. (*) ---

75. (*)

76. Blue page. (*) ---

77. (*)

78. Yellow page. (*) ---

79. (*)

72	large girl standing
73	la fille
74	large boy standing
75	le garcon
76	large girl standing
77	la fille
78	large dog standing
79	le chien

APPENDIX C

REPLICATION STUDY

Sequence of Speaking and Listening Training

Sequence of Speaking and Listening Training: A Replication Study

The major conclusion of Experiment I, reported earlier in Chapter II, was that speaking training followed by listening was superior to the same instruction in the reverse order. Unfortunately, this finding was clouded by the possibility that the difference was an artifact of the design of the study; the specific question raised was: "Did the group which had speaking first surpass the group that was given listening training first simply because the former had had a shorter forgetting period, one day instead of eight days, between training and test?" The replication study to be reported was conducted primarily to assess this factor of recency as well as to improve on the precision of the experiment.

In the replication study, the speaking-first and the listening-first groups, Groups 1 and 2, were treated in practically the same manner as in the earlier study; only minor revisions were made in the instructional programs and tests. However, in place of the two concurrent treatments, which had received intermediate scores differing significantly neither from each other nor from the first two groups, two new groups were established. These new third and fourth groups were designed to determine the effect of the unequal forgetting periods for Groups 1 and 2. The listening comprehension test served as the major criterion since the test of speaking in the earlier experiment had revealed no reliable differences. Other modifications included the use of more rigorous controls during instruction, the use of voice relays to supply reinforcements for speaking, and a complete record of the performance of subjects during training.

Experimental Design

Group 1 was given listening comprehension training for one week and then one week of speaking training. Group 2 was taught to speak the utterances during the first week and to listen during the second. Groups 3 and 4 were given only listening training, Group 3 receiving this training during the first week, with no relevant instruction during the second; Group 4 received no relevant training the first week and had the listening training during the second. All groups received the posttest on the same day, at the conclusion of the two-week training program.

The factorial design of the experiment may be represented as follows:

		Listening Training	
		First week	Second week
Speaking Training	present	Group 2	Group 1
	absent	Group 3	Group 4

The hypothesis to be tested is whether the difference between Groups 1 and 2 is reliable after adjustment for the difference between Groups 3 and 4. This is best determined by testing the significance of the interaction in this design. A 2 x 2 analysis of covariance, adjusting posttest scores for mental age, was therefore planned.

Subjects

A total of 109 third grade children from an elementary school in a middle class neighborhood were used as the subjects for the study. These children had a mean chronological age of seven years and seven months with a standard deviation of seven months. The mean mental age was eight years and eight months with a standard deviation of thirteen months. At the conclusion of the two weeks of training absenteeism had reduced the total number of subjects to 98. Of this number, 24 children were in Group 1, 26 in Group 2, 22 in Group 3 and 26 in Group 4.

Apparatus

The experiment was carried out in an unused classroom to which children, in groups of ten, were brought for each day's training. Each child took his place in a separate booth which had been placed so that the child could see the screen at the front of the room but not the children on either side. (See Figure 1.) Each child had his own microphone, a head set through which he heard all the pre-recorded instructions and comments, and an individual response panel with three buttons, each button corresponding to one of three pictures. (See Figure 2.)

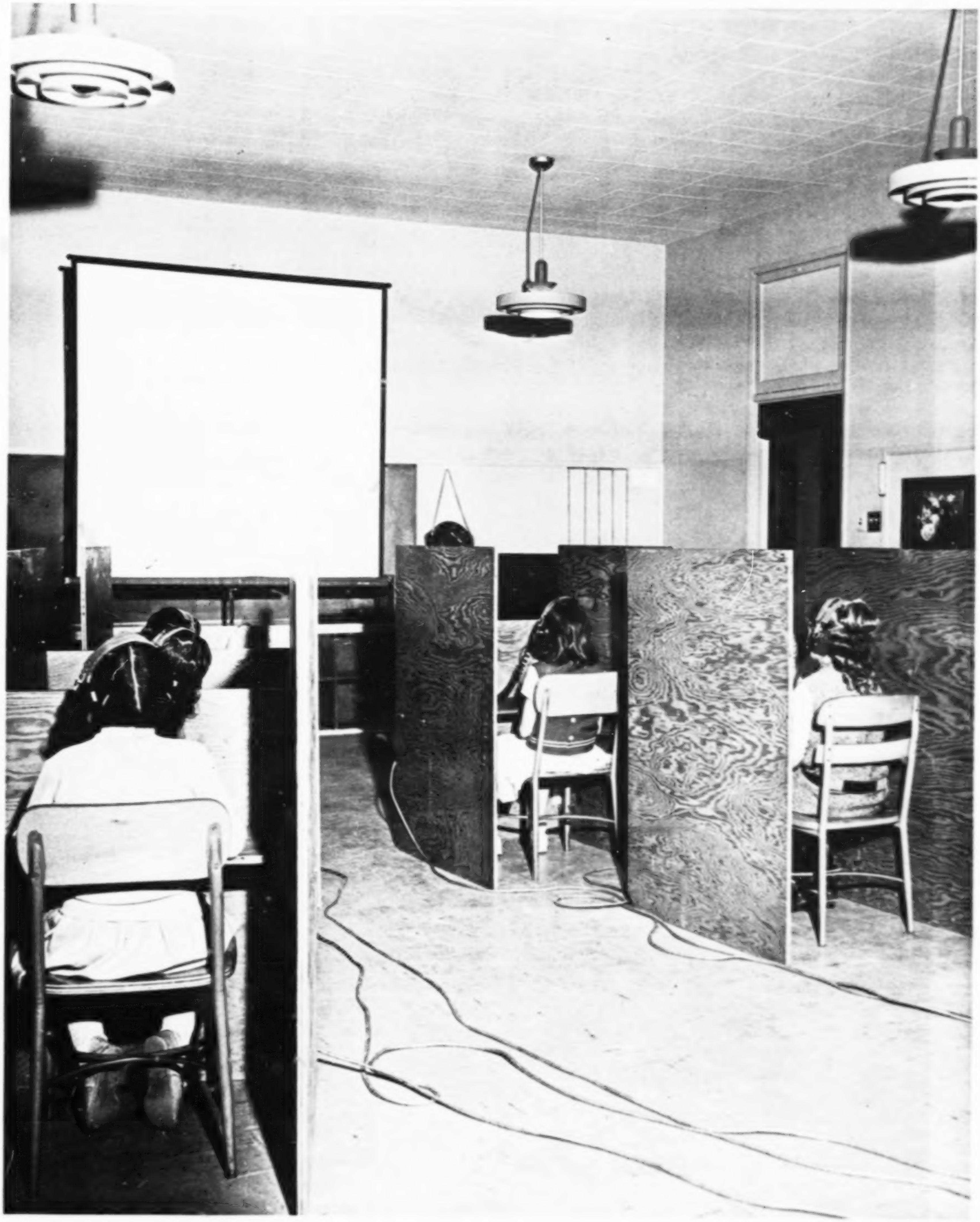


Figure 1. The arrangement of booths for instructional program.

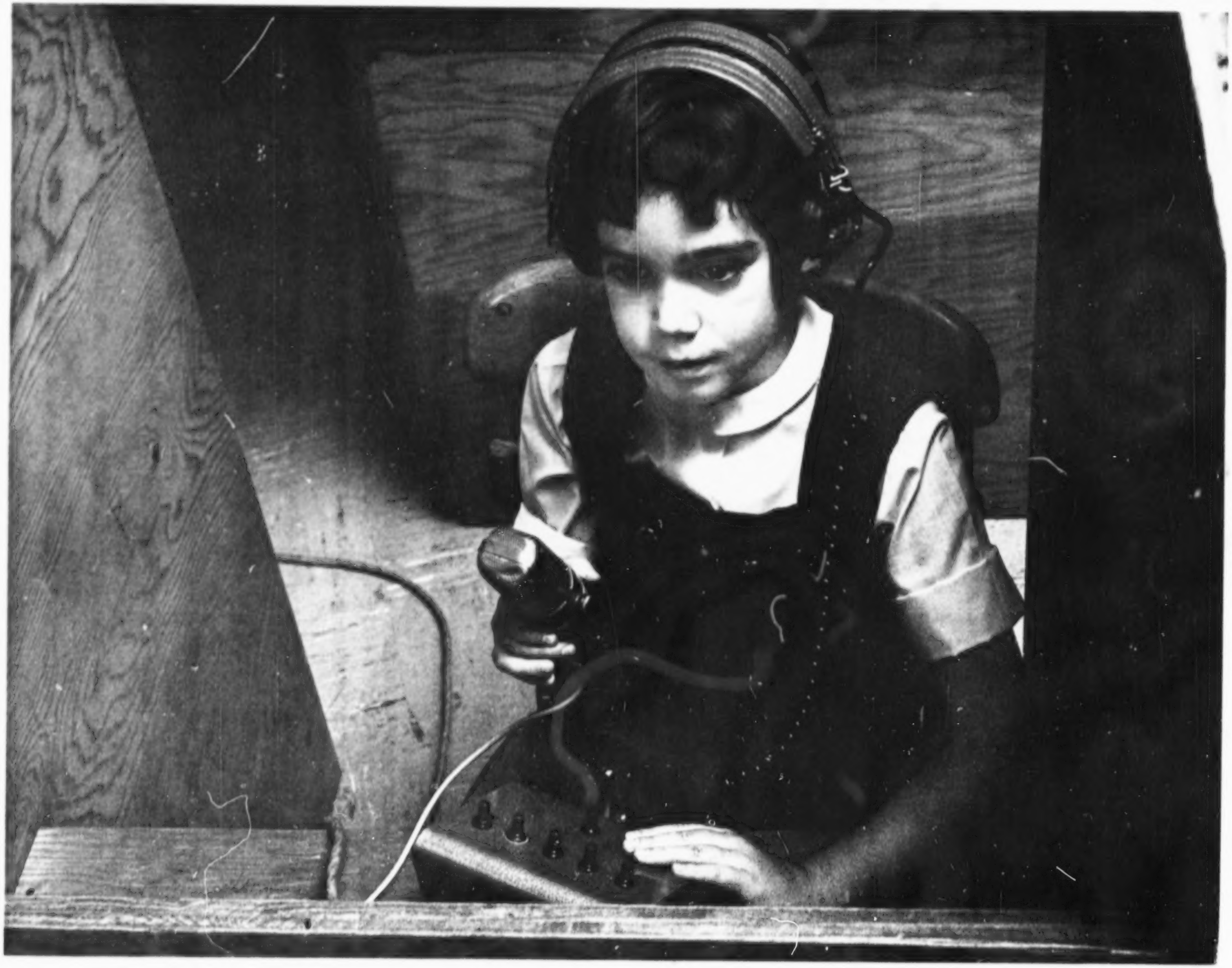


Figure 2. The apparatus used for each child.

The multiple-choice mode was used exclusively for the listening-comprehension program. When the child saw a slide appear on the screen, he heard over his earphones the necessary instructions and a French utterance. After the appropriate commentary, a yellow light appeared on his panel as a signal for him to respond. He registered his choice by pressing the button which corresponded to the picture selected. If the child selected the correct picture, a green light went on. If his choice was incorrect, a red light appeared; this light had to be turned out before another choice could be registered.

For the speaking program, each child spoke into a microphone, which was monitored by the experimenter. The utterance spoken by the child activated a voice relay that turned on the yellow light in the response panel; the child could now "obtain" a green light by pressing one of the buttons. This system for reinforcing vocal responses proved to be highly effective. In the earlier study, Mace had encountered some difficulty in ensuring that the children spoke when they were told to do so. With this apparatus, even those children who were at first timid about talking soon began speaking regularly and clearly; unless they did so they could not get the reinforcing green light.

From the control panel at the rear of the room, 35 mm. black and white slides were projected on the screen from a Kodak Carousel slide projector. This projector had been adapted, now known as the Davis programmer, so that a hole punched in the appropriate spot on the frame of the slide supplied information to the system as to the correct answer. For each frame, lights on the control panel were displayed to show the correct answer and how each child had responded. This information was held in the master panel until the end of the response interval, at which time on impulse from the sound tape, the stored information was automatically read and punched on paper tape by a Clary Account-O-Punch Data Recorder. Another impulse from the tape recorder then cleared the panel, turned off the signal lights, and presented the next slide. (See Figure 3.)

Experimental Instruction

With the exception of minor changes necessitated by the different equipment used, the taped instruction and commentary were identical to those used in Experiment I. (See Appendix A.) However, they were recorded by a person who spoke French as a native speaker.

It is worthwhile to note the performance of the subjects in the four groups during instruction. No recording was made of the students' utterances during speaking training, but information was punched out to indicate whether or not the child had spoken. The performance of the children as obtained by this record showed that practically all subjects gave an overt vocal response on every frame; there appeared to be no important differences on this score between the two groups which received speaking training , Groups 1 and 2.

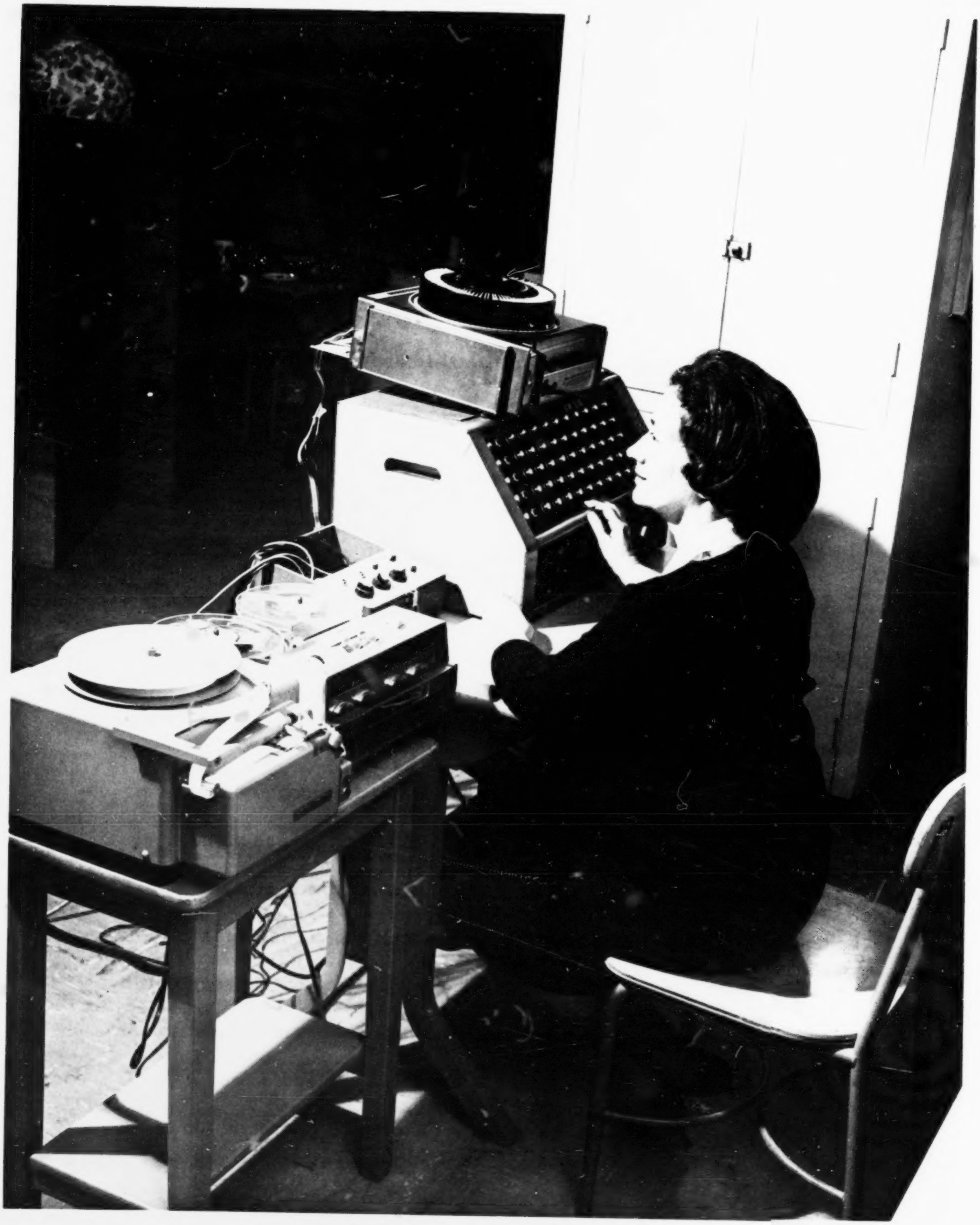


Figure 3. Equipment at control panel (including projector, tape recorder, paper tape punch and monitoring panel).

In studying the performance of all four experimental groups during the listening comprehension training, important differences during training were noted. In Figure 4 are presented the mean performance scores of the four groups on each day's lesson, consisting of sixty multiple-choice frames. As might be expected, the performance of Group 1 during the week of listening training was far superior to any of the other groups. This is attributable, of course, to the fact that these children had already had one week of speaking training prior to the listening instruction, an advantage shared by no other group. Group 3, which had listening training during the first week, demonstrated the poorest performance on each day's training. Slightly above this performance lies Group 2. Group 4, which began listening instruction during the second week, interestingly enough, showed a performance considerably higher than Groups 2 and 3 even though all three of these groups were encountering the program for the first time.

A basic assumption of the experimental design was that Groups 2, 3, and 4 would not differ with respect to the level of comprehension they attained during the listening training. According to this reasoning, differences on the posttest between Groups 3 and 4 would reflect only the difference in the length of the forgetting period: eight days for Group 3 versus one day for Group 4. Unfortunately, this assumption could not be made as the results presented in Figure 4 clearly show.

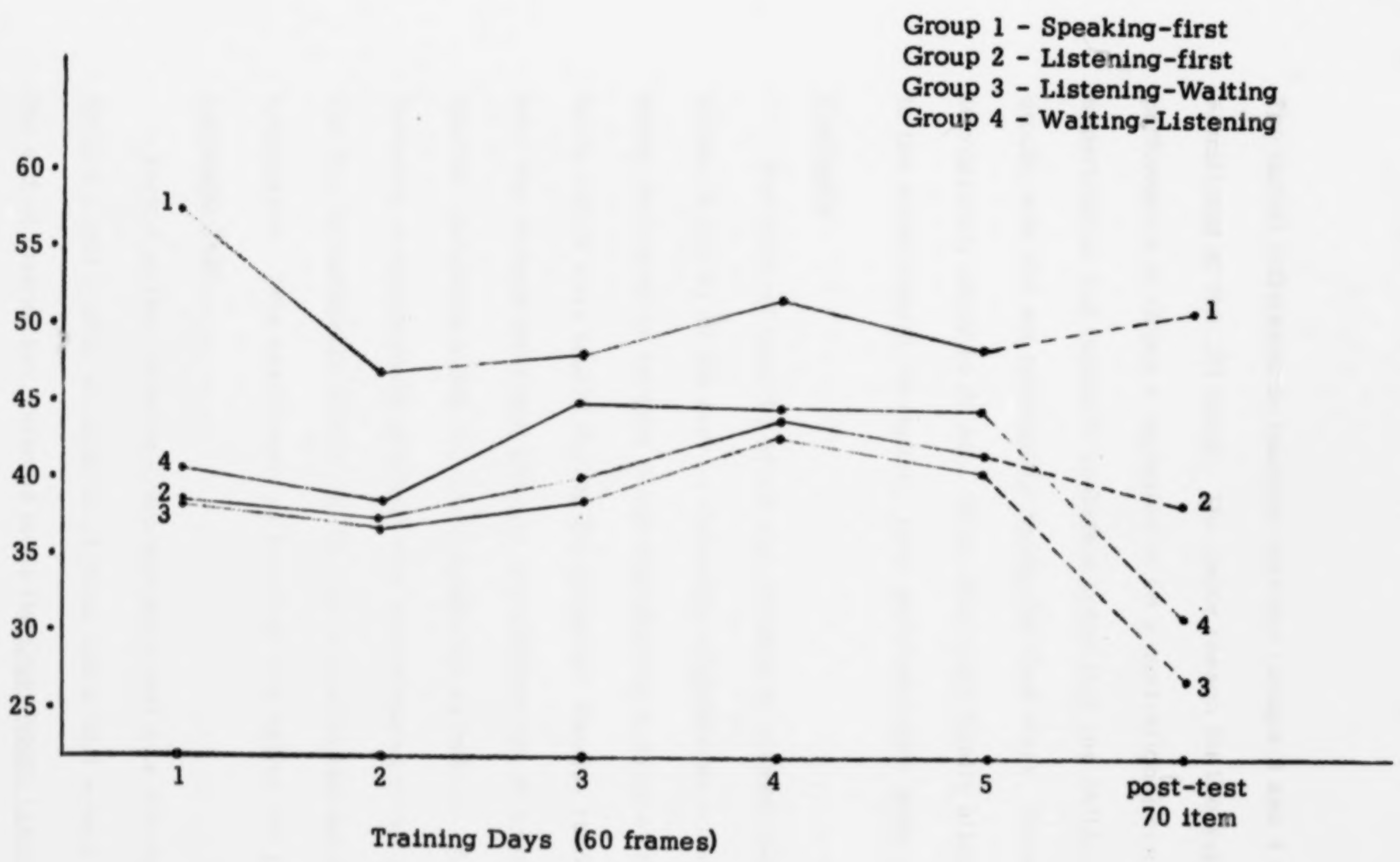


FIGURE 4. MEAN PERFORMANCE ON LISTENING COMPREHENSION DURING TRAINING AND ON POST-TEST FOR FOUR GROUPS

The initial difference in learning between Groups 3 and 4 was significant at the .01 level. The major reason for the superior performance of Group 4 appeared to be a motivational one. The experimenter and research assistant noted that the children in this group, who did not participate during the first week, became increasingly eager to do so. When they were finally allowed to come to the experimental classroom, they performed with great zeal.

Posttests

The posttest used by Mace was revised to provide two different forms, A and B, of the test on listening comprehension. Each of these forms consisted of seventy items representing a sample of the different tasks which were taught during the program. Pupils, randomly selected from the various treatment groups, were tested ten at a time in the special classroom using the same apparatus as before. Form A of the listening comprehension posttest was administered to all subjects of the four experimental groups on the day following the second week of instruction. This assessment of learning was called the Immediate Listening Test.

Form B of the listening comprehension test was administered to Groups 1 and 2 after an interval of three and a half weeks following the end of instruction, referred to as the One-Month Listening Test. The test was not administered to all four groups, at least as originally constituted, since it was judged that the effect of a week's difference in the forgetting period would not be important after a month's interval. The difference between Groups 1 and 2 should therefore reflect almost exclusively the effects of the sequence of instruction independent of the difference in the forgetting periods.

In order to provide additional information regarding the effect of sequence over a long period of retention, posttests were administered a third time, after an interval of three months. The listening-comprehension test, Form A, the Three-Month Listening Test, was administered to Groups 1 and 2. On this occasion, for the first time in this study, the speaking test which Mace had previously used was also administered. For this Three-Month Speaking Test, six children at a time were tested, the subjects being placed in booths spaced so far apart in the room that with earphones the children could not hear each other. Each child's spoken responses were recorded on tape for later scoring, using, as before, the criterion of comprehensibility.

Results

The results of the immediate posttest for listening comprehension are given in Table 1 for all four of the experimental groups. Here it will be noted that while Group 1 is highly superior to Group 2 (49.8 versus 38.0), Group 4 is also superior to Group 3 (31.4 versus 27.6). An analysis of covariance, with posttest scores adjusted for mental

Table 1

Results of Immediate Posttest of Listening Comprehension (70 items)

Group	N	Average mental age (months)	M	S.D. (months)
1. Speaking-Listening	24	104.2	49.8	10.5
2. Listening-Speaking	26	101.8	38.0	13.0
3. Listening-Waiting	22	104.3	27.6	8.9
4. Waiting-Listening	26	106.7	31.4	9.0

age, fails to yield a significant interaction (F = 3.53, df = 1, 93). We are unable therefore to reject the possibility that on the basis of these data Group 1 is superior to Group 2 on this listening test simply because the latter group encountered an entire week of forgetting.

As was previously noted, however, the performance during training of Group 4 was significantly superior to that of Group 3. The difference between these two groups on the posttest do not constitute an estimate of what might be forgetten during the week's period. Rather it is possible that the differences are the result of the initial discrepancy. Consequently, for the three groups who encountered listening training as their introduction to French, posttest scores were adjusted for initial differences in training performance. When this was done, the posttest scores for Group 3 was 39.6 and that for Group 4, 28.7, indicating that it is possible to account for the differences between these two groups entirely on the basis of their performance during training and not on the basis of unequal forgetting. When an analysis of covariance was carried out using adjusted scores for Groups 2, 3, and 4, the interaction was highly significant (F = 10.9, df = 1, 94). This finding clearly supports the hypothesis that the difference between Groups 1 and 2 is not attributable either to chance or to the effects of forgetting.

This statistical method of compensating for initial differences in treatment may be questioned, however, because these differences were not the results of chance but appeared to reflect a systematic bias. A more appropriate test of the hypothesis, therefore, lies in the retention tests. After almost a month, the inequality in the forgetting periods for the speaking-first and the listening-first groups is greatly reduced; the interval was three and a half weeks for the former group, four and a half for the latter.

The results of the analysis of covariance, found in Table 3, clearly indicate that the speaking-first group was also superior on the listening comprehension test, Form B, given a month later. After adjustment for mental age, the difference is significant far beyond the .01 level.

The results of the three months test, also found in Table 3, demonstrate that, at the .05 level of confidence, the speaking-first group maintains its superiority in listening comprehension. The results of the speaking test, given only after a three-month interval, indicate that the speaking-first group is superior, at the .05 level, in their ability to speak the utterances comprehensibly.

Of considerable interest is the fact that there appeared to be so little forgetting of the ability to understand French utterances on the part of Group 1. The results of the comparisons between the two groups with different sequences of instruction are presented again graphically in

Table 2

Results of Retention Tests

Test	Group	N	M	S.D.	F	p
One-Month Listening Test (Form B - 70 items)	1. Speaking-Listening	25	47.8	13.4	16.9	.01
	2. Listening-Speaking	24	33.9	9.8		
Three-Month Listening Test (Form A - 70 items)	1. Speaking-Listening	24	45.9	13.2	6.4	.05
	2. Listening-Speaking	26	35.8	14.0		
Three-Month Speaking Test (320 items)	1. Speaking-Listening	20	202.8	77.9	6.9	.05
	2. Listening-Speaking	19	144.8	50.3		

(320 points possible)

Figure 5. While Group 1 remains consistently higher than Group 3, these young children appear to have retained a good deal of what they learned during a total of less than two and a half hours of instruction.

Conclusion

This replication study has provided evidence that a sequence of speaking and listening is better than the reverse, even on tests of speaking and listening given three months after completion of a two-week instruction program. These experimental findings not only support the results obtained in Experiment I reported earlier, but also permit one to reject the hypothesis that the differences are attributable to the unequal forgetting periods. The fact that the differences held up one month and even three months later makes it clear that factors associated with the sequence variables are undoubtedly responsible.

Naturally, such a conclusion must be restricted to the materials, the instructional procedures, and the kind of subjects used. It is quite possible, for example, that the effect of sequence would not be found at the college level where students may already have acquired a varied repertoire of speaking skills. It is also possible that the sequence effect noted in these experiments is the results of the kind of program adopted. The listening comprehension program may have been too difficult. The accuracy of the performance of the groups on these lessons was not high, averaging between 58% to 67%. It should be

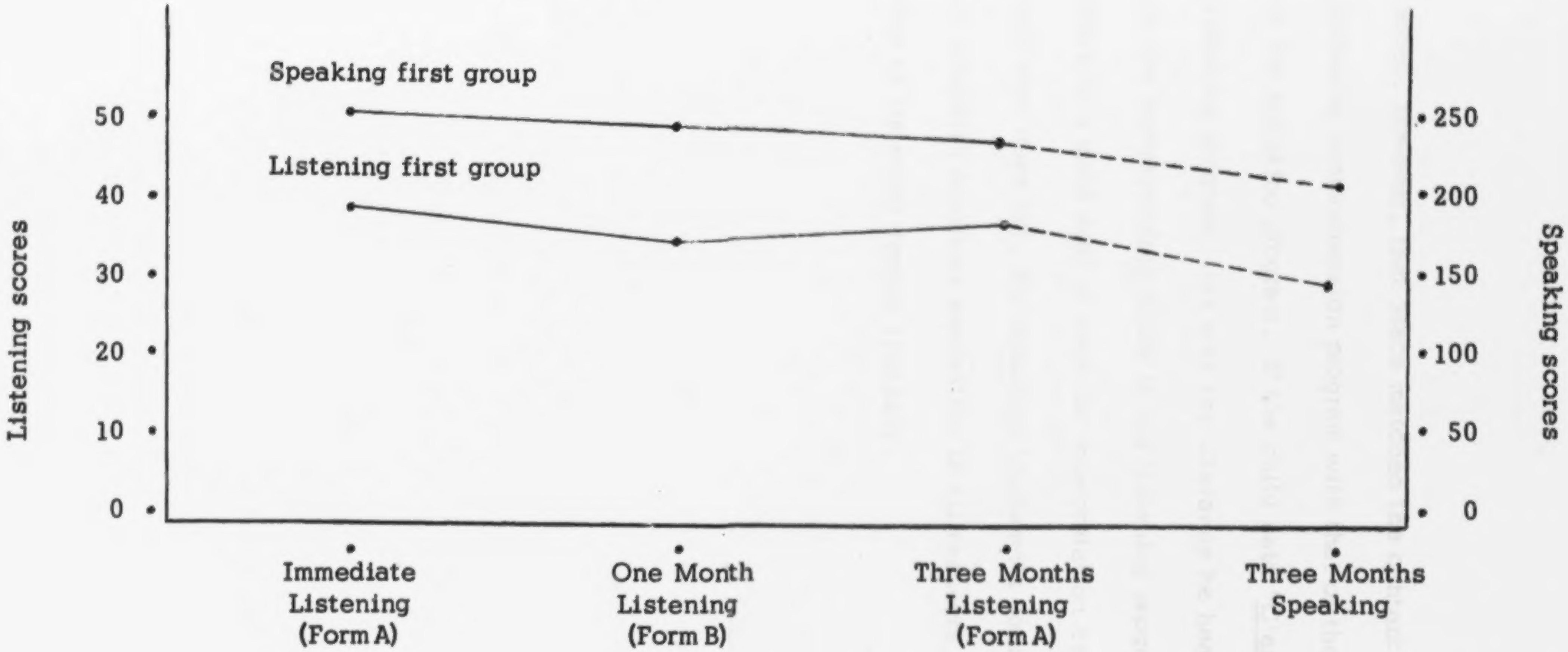


FIGURE 5. CRITERION SCORES FOR THE SPEAKING FIRST AND LISTENING FIRST GROUPS

noted, however, that Mace matched the content of the frames of the listening comprehension program with that of the corresponding frames in the speaking program. If the child said "C'est le garçon" on the speaking program, this was the utterance he heard and had to identify on the corresponding frame in the listening program. While admittedly there is a good deal of room for interpretation as to what corresponds and what does not, the resulting treatments constitute a careful effort to establish programs equivalent in all respects but the critical one, that of listening versus speaking.

APPENDIX D

SUMMARY OF FINAL REPORT

Sequence of Speaking and Listening Training in Beginning French

INTRODUCTION

The interaction of speaking and listening is not well enough understood to permit any judgment regarding the optimum sequence of teaching these two skills to students beginning a second language. The research investigation to be reported represents an outgrowth of a previous project in which the authors explored certain questions relating to instruction in speaking a second language. The present investigation deals with the sequence of speaking and listening training in beginning French.

The purpose of the present report is to clarify the definition of the terms, speaking and listening, by relating them to the processes of stimulus discrimination and response differentiation, and then by specifying in some detail the various measurement procedures which have been used to define these terms. A brief review of the earlier investigation is presented within this framework followed by a summary of the present project. The major conclusions of these studies are summarized along with the implications for both practice and research. It is hoped in this way that the present investigation will be viewed in terms of a theoretical context as well as a long-range search for answers to questions in this field.

Sequence of instruction enters into learning a second language in many ways. The student's native language influences the learning of the new language. The student's other prior experiences with language offer a host of sequence variables which might be studied. In the present research one aspect of the problem of sequence was emphasized. The question dealt with how learning to listen to foreign language utterances affects subsequent learning to speak such utterances, as well as the effect of speaking on subsequent listening. An important concern, therefore, has been the problem of teaching the phonology of a second language, i.e., how students should learn the sound system of the foreign tongue.

In his excellent review of the field of foreign language learning, Carroll (1963) distinguishes four problems in the learning of phonology:

> (1) the problem of _discrimination_, i.e., hearing the differences between phonemes which are not distinguished or used in one's native language;
> (2) the problem of _articulation_, i.e., learning to make the motor movements adequate to proper production of the foreign phonemes;
> (3) the problem of _integration_, i.e., learning to assemble the phonemes of a connected discourse with the proper allophonic variations and "smearing"; and
> (4) the problem of _automaticity_, i.e., making correct production so habitual that it does not need to be attended to in the process of speaking. (pp. 1069,1070)

The first problem in Carroll's list deals with discrimination or listening. The last three problems, articulation, integration, and automaticity, are all involved in speaking.

Carroll has noted that linguists are divided regarding the relation between sound discrimination and sound production. Some maintain, on the one hand, that careful listening to speech sounds in the second language leads directly to an adequate production of these sounds. On the other hand, others maintain that the ability to distinguish among phonemes results from sound production coupled with attention to articulatory phonetics.

A leading representative of the view that listening should precede speaking is Nelson Brooks, who has stated:

> The learner's activities may be briefly summarized as follows: ... he is to hear much more than he speaks, he is to speak only on the basis of what he has heard, he is to read only what has been spoken, he is to write only what he has read ... (Brooks, 1960, p. 50)

In support of this position, Brooks maintains that

> ... it is the ear that dominates the learning and use of speech sounds. Ear training must come first. The second objective is the reproduction by the tongue and adjacent organs of the speech sounds the ear has learned to recognize. (Brooks, 1960, p.107)

Morton (1960) has similarly adopted the principle that listening must precede speaking. In his development of an instructional program in Spanish, he has utilized a procedure of "phonematization" in which the individual "learns first to 'hear' and to 'discriminate' all significant classes of sounds in the new language before a conscious effort is made to reproduce them." Only after the individual has mastered this discrimination task is he permitted to proceed to sound production. Valdman and Mueller (cited by Lane, 1964a) also place listening training first; in their instructional program in French, discrimination training precedes training through echoic responding.

On the other hand, Lane (1964a) in his careful review of the literature summarizes experimental evidence which "suggests that discrimination training ideally should follow response differentiation." In his own work (Lane and Schneider, 1963) he has shown that even after fine discriminations of Thai tonemes have been established there is inadequate production of such sounds.

Liberman (1957) has given evidence in support of the position that articulation serves an extremely important role in speech perception. He concludes that discrimination between auditory stimuli is facilitated by vocal responses which function as mediating behavior to add distinctiveness to these stimuli. This "motor theory of speech perception" has been further elaborated by Lane (1964b). There is a considerable body of evidence (e.g., Norcross and Spiker, 1957) which suggests that the learning of verbal labels also adds to the distinctiveness of non-auditory cues.

Definitions of Listening and Speaking

One reason for the current confusion regarding the sequence of listening and speaking in foreign language learning is that there is little agreement regarding the meaning of the terms. For example, the term "listening" has been used by Hamilton and Haden (1950) to include training in which students repeated aloud the utterances they heard. Even when "listening" is supplanted by the more technical word "discrimination" it is still given a variety of meanings. Discrimination sometimes refers to a comparison test to see if the student, by his verbal report, can "tell the difference" between two speech sounds in the foreign language (e.g., Suppes et al, 1962, cited by Lane, 1964a). Elsewhere, discrimination means that the student is able to tell whether a given sound is properly pronounced so that it "belongs to" the language in question. Or, discrimination may mean being able to classify sounds appropriately into proper phoneme categories, perhaps by supplying an appropriate name or phonetic symbol for such a category (e.g., Morton, 1960). Lastly, discrimination may imply that a student is able to "understand" an utterance when he hears it; that is, to "listen" means to "comprehend" (vide Brooks, 1959).

"Speaking" also has received a number of different definitions. It sometimes includes echoic responding, although most would not limit the definition to vocal mimicry. Speaking sometimes refers solely to the adequate native-like pronunciation of foreign language words. Lastly, it may mean producing utterances which are appropriate to a given situation.

Some investigators have related the terms "listening" and "speaking" to the more technical concepts of "stimulus discrimination" and "response differentiation" respectively. Applied to the acquisition of a second language, stimulus discrimination has been used to refer to the process of learning to respond in a distinctive fashion to an utterance which is spoken to the learner, while response differentiation has referred to the process of learning to emit vocal responses which are similar to those of native speakers. As noted above, however, a difficulty is that even these technical terms have not been used in a consistent fashion by different investigators and writers in second language learning. The technical terms have been given almost as great a diversity of meanings as have the more popular words "listening" and "speaking."

Rather than engaging in further discussion about what the terms should mean, it may be useful to look at the ways in which student competencies in speaking and listening may be assessed in purely operational terms. This can be done by specifying the tasks which constitute useful training and testing procedures. A task is a single unit of instruction aiming toward a limited instructional objective. A task should be described in terms of the general instructions given to the student, the particular stimulus provided, and how the student may be expected to respond.

Listed in Table 1 are some of the tasks which have been used for instruction in foreign language by different investigators. The table is restricted to speaking and listening; to include additional competencies, such as composition, the list would have to be extended. Throughout the table, the word "utterance" refers to the same specific utterance in a foreign language. The sentence C'est un chat could, for example, appear as the stimulus or part of the stimulus for every task involving listening and as a response term for every task involving speaking. On this basis a separate table, like Table 1, could be constructed for each utterance in the language.

The tasks have been arranged in two general classes: those which stress listening and those which stress speaking. In the first class, listening, the process of discrimination is emphasized. Here all of the stimulus terms involve spoken French utterances. While response differentiation may be part of the task, the major concern is "listening to utterances," and not producing them. The different responses are simply various ways of indexing discrimination. The

TABLE 1: LISTENING AND SPEAKING TASKS IN SECOND LANGUAGE LEARNING

Category	Task No.	Task Description	Instructions	Stimulus	Response
I. Emphasis upon Listening					
A. Discrimination Indexed by Sample Comparison	1	Sample Comparison	"Are these utterances the same or different?"	Two utterances. Two identical or two different but similar utterances in foreign language	Says "same" or "different" OR presses one of two buttons.
	2	Model to Sample Comparison	"Is the sample like the model?"	Two utterances. A model pronunciation of the same word(s).	"Yes" or "No"
B. Discrimination Indexed by Evaluation	3	Matching to Sample Evaluative Comparison	"Which pronunciation is correct?"	Two utterances. One correct, one poor	"First" or "Second"
	4	Utterance	"Is this good pronunciation?"	A single utterance.	"Yes" or "No"
C. Discrimination Indexed by Writing	5	Dictation	"Write down the utterance (using the notation previously acquired)."	A single utterance.	Writes out the utterance (conventional spelling or phonetic alphabet).

TABLE 1: LISTENING AND SPEAKING TASKS IN SECOND LANGUAGE LEARNING (continued)

Category	Task No.	Task Description	Instructions	Stimulus	Response
C. Discrimination Indexed by Writing (continued)	6	Utterance-to-Writing Matching	"Select the correct written form of the utterance (or a part of the utterance)."	A single utterance (plus two or more written forms as choices).	Chooses one of the alternatives (e.g., circles word, pushes button).
D. Discrimination Indexed by Comprehension (Listening Comprehension)	7	Utterance-to Picture Matching	"Select the picture to which the utterance refers."	A single utterance, plus two or more pictures as choices.	Selects one of the pictures.
	8	Following Instructions	"Do what the utterance requires."	A single utterance, plus objects and physical setting.	Individual performs some action (e.g., closing door, etc.)
	9	Utterance-to-English	"Select the English expression corresponding to the utterance."	A single utterance.	Selects English word corresponding to the utterance.
	10	Oral True-False Test	"Indicate whether statement is true or false."	A single utterance.	Selects "true" or "false."
II. Emphasis upon Speaking					
A. Differentiation Indexed by Echoic Responding	11	Echoic Responding	"Repeat what you hear."	Utterance	Speaks utterance.

TABLE 1: LISTENING AND SPEAKING TASKS IN SECOND LANGUAGE LEARNING (conclusion)

Category	Task No.	Task Description	Instructions	Stimulus	Response
B. Differentiation Indexed by Oral Reading	12	Oral Reading (Texting)	"Read these words out loud."	Printed French words	Speaks utterance.
C. Differentiation Indexed by Comprehension	13	Oral Description	"Describe the picture (in a way in which pictures have been described)."	Picture	Speaks utterance.
	14	Oral Translation	"Translate into French."	Utterances in English	Speaks utterance.

individual must learn when (i.e., to what utterance) to respond in a given fashion.

In the second class, speaking, response differentiation is emphasized. The learner must articulate the response using a pattern which approximates native speech. Although the learner must have learned when to produce the utterance, the emphasis of these speaking tasks is upon how he responds. The different stimuli are merely various ways of evoking the spoken response.

In the table, ten tasks are presented in the first major division, Emphasis on Listening. These ten tasks have been grouped into categories, each category representing one meaning of discrimination or listening. It is assumed that the tasks within the same category are mutually facilitative, or, to some extent, equivalent. In other words, it is assumed not only that two tasks within the same category are correlated but also that improvement on one will effect an improvement on the other. For example, if the student has mastered Task 5, i.e., to write a French word when he hears a certain utterance, he should be able to do quite well on Task 6 for that same utterance, i.e., to identify the aurally presented word by selecting the correct written form. Task 6 will, in turn, facilitate learning in Task 5. In the present formulation, given in Table 1, all tasks within the same category have either similar stimulus terms or similar response terms. However, the facilitation is not simply a case of primary stimulus or response generalization; the transfer which results from one task to others within the category occurs on the basis of prior learning, a process of secondary or mediated generalization.

Turning to the tasks in the individual categories, the tasks in Category IA, "Discrimination Indexed by Sample Comparison," represent the kind of tests which would probably be used by investigators who wish to see if students can "hear the difference" between sounds in the foreign language.

Learning to discriminate among utterances also involves learning to classify utterances, that is, learning to respond in the same way to different utterances belonging to the same phoneme class. Not only must the student learn to disregard differences on irrelevant dimensions, but he must disregard differences on critical dimensions as long as the utterances fall within acceptable limits of the same phoneme. The tasks in Category IB, "Discrimination Indexed by Evaluation," require this kind of classification. Here the student is instructed not merely to note whether the sample is like the model, but whether it belongs to the same class of allophones as the model. A closely related task is an evaluation of pronunciation in which presumably the individual is required to indicate whether the utterance belongs in a class within the foreign language or falls outside of any acceptable class.

The tasks in Category IC, "Discrimination Indexed by Writing," require the learner to write or identify the written label for a class of utterances using either the orthography of the second language or a phonetic alphabet. The fact that a student can perform these tasks does not necessarily mean that he "understands" what he is writing.

Category ID, "Discrimination Indexed by Comprehension," includes a number of tasks which involve a single utterance as a stimulus but which require varying kinds of responses. For any person skilled in the English language these tasks should be roughly equivalent. With mature students, it makes little difference whether the task calls for selecting a picture of a dog or the word _dog_ when the French utterance _le chien_ is given.

Within the second major division of the table, _Emphasis Upon Speaking_, all the tasks involve producing the same utterance; it is the stimulus for this response which differs from one task to the next. The most central task for speaking training is Task 11, "Echoic Responding," in which a learner repeats the utterance he hears. The primary purpose of this imitative task is to evoke an approximation of native-like pronunciation efficiently. While it is true that some discrimination is involved in "hearing" the model utterance, response differentiation (speaking) is most important. With Task 12, "Oral Reading," the utterance is evoked by the printed French word with no necessity for comprehension. For Tasks 13 and 14 there is evidence not only that the individual can pronounce French words acceptably, but that he can speak appropriately for the occasion; that is, he understand what he is saying.

This list of tasks does not include other more important and more advanced tasks introduced in beginning French. For example, pattern practice frequently requires the student to produce French utterances which are transformations of the expressions he hears. He may be required to change a spoken French statement into a question, or to alter the person or number of the utterance, most of the tasks involved in what language teachers call "facility in language" would involve responding in a more complex fashion to more complex stimuli than are described here. Further investigation is required to determine the value of analyzing French instruction at these more advanced levels in terms of a stimulus-response approach.

It has not been the purpose here to provide a single definition for each of the terms, "speaking" and "listening," but rather to clarify the way in which these words are currently used in language research and teaching. Our approach has been to define the terms according to the tasks, i.e., the training and testing procedures which appropriately identify "speaking" and "listening" for each study carried out.

The problem of sequence of listening and speaking in the learning of French was attacked in two major investigations. The question faced in the previous investigation involved only one sequence, the effect of preliminary training in listening upon a subsequent speaking task. Two major experiments, A and B, each adopting a different definition of the term "listening" (Tasks 4 and 6, respectively, in Table 1), were carried out in this earlier study. In the present investigation other sequences of listening and speaking were studied.

Experiment I dealt with the study of two sequences, speaking upon listening, and the opposite, listening upon speaking. Experiment II was a replication of Experiment I while Experiment III dealt with an extension of the notion of sequence to tasks in addition to those of listening and speaking. All of the experiments in the present investigation were conducted under modified language conditions which permit the controlled presentation of slides, sound, recording and printed materials.

The Previous Investigation:
Effect of Prior Discrimination Training on Speaking

The original question grew out of the fact that a student usually learns to produce an utterance echoically, i.e., by echoing back or repeating what he has heard (Task 11). This is possible presumably because he is able to "tell the difference" (Task 2) between his pronunciation and that of the model. Under ordinary classroom conditions the teacher is, of course, able to correct the student who may be unable to evaluate himself realistically.

In the language laboratory, however, a student may think that his performance is satisfactory and continue to produce a response which is actually inferior to that of the model. Lane (1961), for example, found that students who were engaged in such self-shaping echoic behavior leveled off in their pronunciation at a point somewhat different from that of the model. However, discrimination training similar to Task 5, in which subjects were required to identify a particular Thai toneme, resulted in improvement in the pronunciation of that toneme under continued self-shaping.

The major hypothesis of the first investigation was that, if a student is given preliminary training in a discrimination task in the learning of French, subsequent pronunciation training will be more effective.

Developing tests of discrimination

In our initial attempt to develop a discrimination training task, we tried to duplicate as closely as possible the conditions a student might encounter in a language laboratory setting where he was trying to evaluate his own pronunciation. On each item of the first test the student heard the voice of a native speaker followed by an American saying one of four French words containing the phonema /u/ as in la flute. This phoneme, which is not present in English, was judged to be difficult for Americans to pronounce. For each item, the subject was to rate the pronunciation of the American as "acceptable" or "unacceptable." This Task 2 test, given before and after a training program, yielded disappointing results. Other native speakers agreed neither with the original criterion of acceptability nor among themselves. Furthermore, our training program had raised the standards of many subjects so high that their performance on the test dropped; they learned to rate as unacceptable many pronunciations which our judges called acceptable.

In a second test, subjects were required to "tell the difference" between minimal pairs involving distinctions which are present in French but not in English. The task involved eight French words constituting four minimal pairs, e.g., banc - bain. In one version of the test, for each item, the student heard a French word and had to respond by circling one of two English words printed on his answer sheet. The two words were always the equivalent English words for the members of the minimal pair. For example, the subject might hear the French word but (meaning "goal") while he saw on his answer sheet the two English words: MUD -- GOAL. On some subsequent item he might hear the other member of this French minimal pair, boue (meaning "mud"), and would see the same two English words randomly rearranged.

One difficulty we encountered with this Task 9 test was that students seemed to be able to "tell the difference" between the words of a minimal pair but they were unable to remember which English words "went with" the French word. Consequently, we used the same words to develop a sample comparison test, Task 1. Here the student heard two French words on each item. Half the time the words were identical and half the time they constituted a minimal pair. The student responded by circling SAME or DIFFERENT on his answer sheet. Unfortunately, even though we had picked phonemic differences which do not appear in English, the test was too easy for secondary school students. Subjects with no prior second language experience did entirely too well on this test to permit much improvement as a result of training.

To make this Task 1 discrimination test more difficult, therefore, we incorporated each of these words into a phrase and a sentence to make much longer utterances. On the revised test we had items consisting of minimal "phrase pairs" and items with minimal "sentence pairs," for example, Le pont est tombe dans l'eau and Le peau est tombe dans l'eau. Although the test now was quite difficult we realized two serious drawbacks: (1) In a pilot study, we found that it took an exceedingly long time to teach naive subjects to discriminate between such utterances, and (2) Subjects unfamiliar with French could not use context to aid in discrimination and were, therefore, being asked to perform a more difficult job than that faced by a native French speaker!

Although our studies with these tests were not definitive, the use of sample comparisons (Tasks 1 - 3) seemed to be a blind alley; we could not find phonemic discrimination tasks in French which were both difficult and important for secondary school students. We are not prepared to say that there is no value in a certain amount of this type of training at the secondary level in the teaching of French, but the problem itself seems to be a minor one. In their most recent publications, Carroll (1963) and Lane (1964a) report similar findings; they suggest plausibly that experience in the native language may provide considerable transfer to performance of phonemic discrimination in a foreign language within the same language family.

Faced with these difficulties, the previous tests of discrimination were abandoned and new tests were developed for the two major experiments of the first investigation. In Experiment I, discrimination was assessed by having subjects evaluate the pronunciation of an utterance (Task 4). In Experiment II, students were required to discriminate among different French phonemes by identifying the written form of the phoneme (Task 6). For both of these experiments the criterion of speaking consisted of oral reading (Task 12). The design for each experiment was the same: preliminary discrimination training for an Experimental Group and exposure for a Control Group, speaking training for both groups, followed by a speaking test as the criterion. As stated above, the hypothesis tested for each experiment was that the Experimental Group, with preliminary discrimination training, would profit more from its subsequent pronunciation training, and thereby would excel the Control Group in the final speaking test.

Experiment A, Training in evaluating pronunciation of utterances

In the first experiment the subjects were required to learn the pronunciation of a phoneme, the French /o/ as in chaud versus the incorrect dipthongized /o^u/, as in the English word show. For this study, 144 eleventh grade students were tested in a language laboratory, as many as 36 at a time. After a group of students took seats they were assigned randomly, in equal numbers, to either the Experimental or Control Group.

As discrimination training, the Experimental Group was presented with a list of the following words: chaud, sauts, beau, faux and chaux -- each word appearing at random several times. For each item, the same word was pronounced by a native Frenchman and an American. The experimental subjects were required to circle either F or A to indicate whether, for that word, the pronunciation was French or American; then they were told which choice was correct. The same printed words pronounced only by a native speaker were presented to the Control Group, with no arrangement for the French-American discrimination training.

During pronunciation training, all subjects first heard a word pronounced by a native speaker while they looked at the printed word in their booklets. Each subject immediately said the word out loud and listened back at frequent intervals to hear both the model pronunciation and his own.

The posttest required the student to read out loud a list of French words as he heard the number spoken for each word. The test tapes were scored independently by two native judges who gave ratings on a seven-point scale for each subject; the score on the test was the sum of the two ratings. The correlation between the judges' ratings was .84, indicating a very satisfactory inter-judge reliability.

The difference between the mean pronunciation scores for the two groups was not reliable. However, on a discrimination test given after the experiment the Control Group was highly superior to untrained subjects from the pilot studies. It appeared, therefore, that this discrimination task, which required identifying good and poor pronunciation (Task 4), was learned relatively well without the special discrimination training received by the experimental subjects.

Our experience with this experiment and the previous studies had led us to reject discrimination tests of the same comparison type (Category IA) first, then tests involving translation or comprehension (Category ID), and finally tests requiring pronunciation evaluation (Category IB). Therefore, for the next experiment we adopted a discrimination task requiring a student to identify an utterance by selecting its correct written form (Category IC).

Experiment B, Training in identifying written forms of utterances

In the second experiment, instead of learning good and poor pronunciation, the experimental subjects were taught to discriminate among French words containing different nasal vowels: when they heard a French utterance they had to identify the corresponding printed word (Task 6). Like Experiment I, the criterion test consisted of reading these words aloud (Task 12). The subjects were 196 eleventh grade students.

The phonemes among which discriminations were to be taught consisted of the nasal vowels /ẽ/, /õ/, /ã/. The experimental subjects circled the correct printed forms of words containing the phonemes (e.g., pend, point, pain) when they heard the words

5

pronounced, and then received immediate confirmation. Control subjects heard the same words but saw only the correct printed forms; they were simply told to listen carefully. During speaking training all subjects looked at a list of printed words as they repeated the model utterances of a native speaker, recording their pronunciation attempts and listening back as in Experiment I.

On the posttest, each subject read out loud each word listed on a test booklet. In scoring the recordings of this test, each of the two judges listened to the word a subject uttered and decided which one of the three phonemes /ẽ/, /õ/, or /ã/ had been uttered. This was recorded on the scoring sheet, the total score for each subject being the number of correct items the judge could recognize.

The results showed that the Experimental Group obtained a mean score of 36.0 and the Control Group 28.9 with standard deviations of 11 and 9, respectively, a significant difference. It was concluded that the discrimination training among these phonemes, in comparison with mere exposure to the materials, resulted in superior speaking performance.

Discussion of Experiments A and B

In attempting to assess the effect of discrimination learning upon subsequent pronunciation training, one should notice that in Experiment II it made no difference how poorly a student pronounced the words as long as they were comprehensible to the judges. In fact, students could have given a version of the sound which was completely lacking in any nasal quality and still have made a perfect score, as long as the judges identified which one of the three phonemes the student was trying to say. Students need not have learned to differentiate the responses (pronouncing the nasal vowels), but only to give some approximation for this purpose, well-differentiated responses from the familiar English phonemes would have been adequate.

During the preliminary discrimination training of Experiment B (Task 6) the student learned to identify a written form when he heard an utterance. In the subsequent pronunciation training and on the criterion test the student did the opposite; he produced a given utterance when he saw a printed word (Task 12). The fact, therefore, that the experimental subjects did so well on the criterion test may be seen as an example of the reversibility of paired-associate learning in which a stimulus term in one training period becomes the response term in a later session.

Such an effect has been previously demonstrated by Murdock (1956) and Feldman and Underwood (1957). McCormack (1961) refers to the phenomenon as an R - S or backward association as opposed to S - R or forward association. On the other hand, in Experiment A where the preliminary discrimination training was not shown to be effective, the discrimination task was not the reverse of the speaking task; students in this experiment identified not the printed form of the word (which they later had to read) but a letter to indicate good or poor pronunciation.

In interpreting the results of the two experiments, the negative findings in Experiment A and the substantial findings in Experiment B, one should note two major differences in the two studies. First, unlike Experiment A, the discrimination task in Experiment B was the reverse of the speaking task. Second, the speaking responses in Experiment B were evaluated not in terms of quality of pronunciation but in terms of comprehensibility, that is, in terms of rough approximation to the desired speech. In Experiment B, therefore, emphasis was placed on associative learning, not on response differentiation as in Experiment A.

The Present Investigation:

The effects of different sequences in learning French vocabulary

The previous investigation dealt with the effect of preliminary discrimination training, or "listening," upon subsequent training in sound production, or "speaking." In the present investigation the problem was extended to include this study of the effects of this order of training as well as the reverse, the effects of speaking on listening.

A number of changes were made in this continuing study of sequence. First of all, pupils in the primary grades were used instead of secondary school students. In a pilot study carried out at the beginning of the second investigation, it was found that early primary school children were much less competent than older children in learning to say seven-word French utterances after being taught these utterances through echoic training procedures. Second grade and third grade children on the average could repeat only 1.8 of the seven words satisfactorily, while sixth grade and seventh grade children, by the same standards, averaged 3.4 words. From this evidence it was concluded that, contrary to many opinions, young children do not echo foreign utterances as well as older children;with these younger subjects the effects of sequence training might be more pronounced.

A second major difference concerned the definition of discrimination adopted in this new investigation. Experiment A and the previous pilot studies had shown the lack of utility in defining discrimination either by sample comparison or by evaluation of pronunciation; our subjects found these tasks so easy that there were no measurable training effects. In Experiment B, the learner not only had to discriminate among three similar phonemes by identifying the corresponding written form, he also had to learn when to produce the correct pronunciation for each one. As discussed earlier, the critical feature of Experiment B was the requirement of paired-associate learning. However, in neither of these experiments were subjects told the English equivalents of these words; the task did not involve comprehension or "meaning." In the present investigation, on the other hand, since the paired-associate terms consisted of different forms of the French utterances and the corresponding pictures; subjects had an opportunity to learn the meaning of the utterances.

Experiment I. Effects of different listening and speaking sequences.

In the first experiment of the present investigation, the major emphasis was placed upon speaking, learning to make a particular utterance in the presence of the appropriate picture (Task 13), and listening comprehension, learning to identify the appropriate picture in the presence of the utterance (Task 7). The question was "Which will have the greatest facilitative effect upon speaking and listening performance, speaking training first, listening training first, or concurrent training in the two tasks?"

A ten-day program was prepared for the teaching of beginning French consisting of five daily lessons of speaking training and five lessons of listening training. The subjects learned to speak and to comprehend utterances which were short sentences composed from a group of approximately a dozen words (e.g., Le grand chien est debout and La petite fille est assise). Each lesson, lasting about ten to fifteen minutes, consisted of 60 "frames" of programmed instruction in which six children, each in an individual booth, saw slides projected on a screen while they heard a commentary over earphones. Through duplication and rearrangement of the 600 frames, four sequences of materials were created, one for each of four experimental groups. These sequences were composed of identical frames arranged in different orders.

The subjects, 108 children from the first, second, and third grades, were assigned to the four treatment groups, 27 in each group. Group 1 received five daily lessons of speaking training, followed by five days of listening training. Group 2 received five daily lessons of listening training followed by five days of speaking training. Groups 3 and 4 received these two types of training concurrently. Group 3 received a 15-frame segment of speaking training followed by a 15-frame segment of listening training. Two more segments in the same order completed the 60 frames of instruction for the day. Consequently, each day the third group was given 30 frames of speaking instruction and 30 of listening comprehension. The training was the same for Group 4 except that each day the listening training segments came before their speaking counterparts. For groups 1 and 3, therefore, speaking training came first; for groups 2 and 4, listening comprehension training came first.

Following the ten days of instruction all subjects were given a listening comprehension test twice, once at the conclusion of the instructional program, and again two weeks later as a retention test. During this two-week interval all subjects were given an individual speaking test. These tests included only the terminal frames of the respective programs.

The results of the listening comprehension test showed that the groups which had received speaking training first (Groups 1 and 3) excelled the two groups which received listening training first. This difference was also significant on the same listening test given two weeks later as a retention test. The difference on the speaking test, which also favored the speaking first groups, was not reliable.

On the listening comprehension test, Group 1 (with five days of speaking training first), was significantly superior to Group 2 (with five days of listening training first). The means were 44.9 and 34.8 with standard deviations of 13.8 and 16.2 respectively. The difference was maintained on the retention test where the means were 48.5 and 35.2 with standard deviations of 12.2 and 17.0 respectively.

No differences were established between the two concurrent groups whose means were 42.3 and 40.8 on the listening test and 45.2 and 40.8 on the retention test.

One major interpretation of the results is that speaking training provides a student with a vocal response which permits greater progress during subsequent listening training. This vocal response may constitute a mechanism which increases the distinctiveness of the utterances heard (cf. Norcross and Spiker, 1957; McNeil and Keislar, 1963).

If this interpretation is correct, it would suggest that training in beginning French, at least where materials like those in the present study are used, might well require the child to learn to speak very early in the instructional program. It appears that the child's ability to comprehend spoken French is greater than if speaking is delayed.

Another interpretation of the findings is possible in terms of recency. The group with five days of speaking training first might have done better on the listening test simply because they had just concluded their training on this type of task. While this interpretation appears weakened by the fact that, after two weeks, the obtained differences on this test were even greater, further evidence was called for on this question. A replication experiment was planned to clarify these ambiguities.

Experiment II. Replication experiment on sequence of listening and speaking.

The objective of the replication study was to test the major conclusion of the previous experiment: a sequence of speaking training followed by listening training is superior to the reverse order. The central criterion was the test of listening comprehension since it was only on this measure that significant results had been obtained in the previous study.

The replication was carried out with 98 second and third grade children. Four experimental groups were established, ranging in size from 24 to 26 at the end of the two-week study. As in the prior experiment, Group 1 received a week of speaking training first and then a week of listening training while Group 2 had the reverse sequence. The additional two groups, which were given only the listening training, were used in order to provide an assessment of the effect of recency of listening comprehension training. During the first week, pupils in Group 3 received listening training; they remained in their classrooms during the second week. Group 4, on the other hand, appeared for instruction for the first time at the beginning of the second week. It was hoped that the difference in the posttest between Groups 3 and 4 would offer some assessment, therefore, of the amount of the forgetting of the listening training that might be expected over a week's time.

In this replication experiment, a number of improvements were made with respect to instructional and testing procedures. Children appeared in groups of ten during the day at the experimental classroom for their daily ten to fifteen-minute lesson. Each child was seated in a booth so that he could not see any of the other pupils but could observe in front of him a screen on which 2 x 2 slides were projected. He heard the commentary from the tape over earphones. For the listening-comprehension program, he responded by pressing buttons; red and green lights were supplied to provide knowledge of results. For the speaking program, a system of voice relays was used so that when the child spoke out loud he was provided with a reinforcement in the form of a green light. This procedure proved to be tremendously effective since practically all of the children very quickly spoke clearly and audibly throughout the speaking training. A complete record was kept of all the children's responses to the multiple choice questions during training and testing sessions by having data punched out on paper tape from which it was decoded and processed through computers.

On the posttest, which had a maximum of 70 points, given at the end of the second week of training, the speaking-first group, Group 1, had a mean score on the listening-comprehension test of 49.8 while the listening-first group, Group 2, had a mean of only 38.0 with standard deviations of 10.6 and 13.0 respectively. Although this difference is significant, it is important to consider the possibility that some of this superiority is attributable to the unequal forgetting periods for the two groups. We therefore should note that Group 3, which had a week's interval between training and testing, had a mean of 27.6 while Group 4, with the posttest immediately following instruction, showed a higher mean of 31.4. It was necessary to determine the significance of the difference between Groups 1 and 2 after adjustment for the difference between Groups 3 and 4, presumably attributable to the forgetting during the week's interval. For this purpose a 2 x 2 analysis of covariance was carried out (posttest scores being adjusted for mental age) and the significance of the interaction tested. The results fell short of significance.

A basic assumption of this experimental design, however, was that these two randomly drawn groups would not differ reliably in how much they learned during the week of instruction. Unfortunately, the assumption could not be made since the children in Group 4, tremendously eager after a week of being "neglected," showed a significantly higher performance ($p < .01$) throughout the week of listening instruction than did Group 3. When the final scores of the three groups which began their instruction with listening comprehension training were adjusted for initial differences in performance during instruction, the adjusted means of the posttest between Groups 3 and 4 did not differ reliably (29.6 and 28.7 respectively) and the interaction proved to be highly significant.

This statistical way of dealing with the unequal forgetting periods, however, is somewhat questionable since the initial differences in learning were clearly not attributable to chance. It is therefore more appropriate to look at the retention test scores which were given almost a month following training. The initial difference of one week should, after such an interval, have relatively little effect. On this posttest 2, the speaking-first group showed a mean of 47.9 while the listening-first group had a mean of 33.9, standard deviations being 9.8 and 13.4 respectively. The difference here was highly significant, providing further support of the difference between the two groups.

To provide additional evidence of the effect of sequence in this experiment, both speaking and listening-comprehension posttests were administered three months after the conclusion of the experiment. For this long-term retention test, the speaking-first group was superior, at the .05 level of confidence, not only on the listening-comprehension test but also on the speaking test. On the listening test the speaking-first group had a mean of 45.8 while the listening-first group had a mean of 35.9, SD's being 13.9 and 13.2 respectively. On the speaking test, the mean of the speaking-first group was 200.9, that of the listening-first group being 146.8, with SD's of 50.3 and 77.9 respectively. Of particular interest was the relatively small amount of forgetting shown by the speaking-first group.

The results of these retention tests clearly indicate that not only was the speaking-first group superior a month and also three months later in the listening-comprehension skills, but they were also superior with respect to speaking ability (as measured by the criterion of comprehensibility). The replication experiment provided ample evidence that, under these instructional procedures, children in the primary grades profited more by instruction in speaking first followed by listening-comprehension training than they did by the reverse sequence.

Experiment III. Variation in number of related tasks which are mastered.

In the previous experiments, the tasks involved a number of different kinds of stimulus and response combinations. Since our primary interest up to this point had been in speaking or listening, all of these tasks have involved a French utterance, either in the stimulus term or in the response term. For example, on certain occasions students selected a picture from among alternatives when they heard a French word spoken; on other occasions, they said the word aloud when they saw its printed form. However, many other combinations are possible, Students, for example, might write the appropriate word in French when they see a picture, or they might select a picture which corresponds to a given printed word. It is clear that these combinations are not independent of each other for a given vocabulary item; for example, it has already been noted (p.252)that mastery of one task facilitates the learning of its opposite, illustrating the reversibility of stimulus and response terms. Experiment III of this series dealt with the facilitation of one task as a result of learning another related task for a given French word. Moreover, it explored whether learning *several* such tasks will further facilitate the mastery of certain others. The central question raised in Experiment IV was, therefore, whether the performance on certain tasks of a vocabulary item is related to the *number* of other tasks for this same item which have already been mastered.

In Experiment III, the tasks for a vocabulary item were viewed according to the following stimulus and response paradigm:

S_1	picture presented	R_1	subject selects picture
S_2	word presented aurally	R_2	subject says word
S_3	written word presented	R_3	subject writes word

Since each stimulus in the left-hand column may be associated with any response in the right-hand column, there are nine different stimulus-response combinations of these terms. Three of these combinations were called *formal tasks* since the stimulus resulting from a response was of the same physical form as a model stimulus. Referring to the paradigm, these three formal tasks were S_1R_1 or picture matching, S_2R_2 or echoic responding, and S_3R_3 or transcription. The remaining six tasks, S_1R_2, S_1R_3, S_2R_1, S_2R_3, S_3R_1, and S_3R_2, were called *associative tasks* since there was no physical correspondence between the stimulus and response forms; the learning here is analogous to paired-associate learning.

TABLE 2

TASKS LEARNED BY FIVE TREATMENT GROUPS IN EXPERIMENT IV

Group I	Group II	Group III	Group IV	Group V	
S_1R_1	S_1R_1	S_1R_1	S_1R_1	S_1R_1	**Picture Identification**
S_2R_2	S_2R_2	S_2R_2	S_2R_2	S_2R_2	**Echoic Responding**
S_3R_3	S_3R_3	S_3R_3	S_3R_3	S_3R_3	**Transcription**
	S_1R_2	S_1R_2	S_1R_2	S_1R_2	**Speaking (Tacting)**
		S_2R_3	S_2R_3	S_2R_3	**Dictation**
			S_3R_2	S_3R_2	**Texting**
				S_3R_1	**Reading Comprehension**
S_2R_1	S_2R_1	S_2R_1	S_2R_1	S_2R_1	**Listening Comprehension**
S_1R_3	S_1R_3	S_1R_3	S_1R_3	S_1R_3	**Composition Test**

The formal tasks represent primarily response learning. The acquisition of such a response repertoire is prerequisite to the associative learning involved in foreign language instruction. Perhaps most important is the development of vocal responses which ordinarily require a good deal of training through echoic responding (S_2R_2). The writing responses also may require considerable training in transcription (S_3R_3), especially if the orthography used is quite different from that of English.

Mastery of the three formal tasks provides the student with the responses which are necessary for learning the associative tasks for a vocabulary item; the individual may now learn to associate these responses with stimuli other than the model stimuli. This "hooking up" of stimuli and responses, to use the expression of Underwood and Schulz (1960), is the central feature of Experiment IV. The problem may be restated as follows: For any given vocabulary item, following the mastery of the three formal tasks, will the ease of learning certain associative tasks depend upon the number of the other associative tasks that have already been mastered?

The subjects for this experiment were 100 third grade children assigned to five treatment groups of twenty subjects each. For three French vocabulary items (le garcon, la fille, and le chien), all subjects were first given equal training in the three formal tasks. Then training in an additional number of associative tasks was varied for each of the five treatment groups who were given training in

0, 1, 2, 3, and 4 additional associative tasks, respectively. These additional tasks were as follows: speaking or "tacting" (picture presented, subject says word), dictation (word presented orally, subject writes word), texting (written word presented, subject says word), and reading comprehension (written word presented, subject selects picture).

In Table 2, the tasks which each of the five groups were taught are listed in the column below the group number. In addition to the particular training for each group shown in Table 2, each group received enough additional practice with the materials so that the total amount of sheer exposure to the stimulus term as well as practice on the response term was the same for all subjects. Finally, two test tasks were administered. These tests required learning, for each of the three French words, the final two associative tasks which were not taught previously: listening comprehension (word presented orally, subject selects picture) and composition (picture presented, subject writes word).

The means for the five treatment groups on the listening comprehension test indicated a statistically significant linear function between the number of associative tasks taught during training and the ease of learning the listening comprehension task. On one test, scored in terms of the number of trials the subject took to master listening comprehension to a criterion, the mean scores for the groups receiving 0, 1, 2, 3, and 4 additional associative tasks were 31, 20, 20, 21, and 14 respectively. There was no analogous finding for the results of the writing test.

Often it has been claimed that vocabulary learning proceeds better in a "meaningful context" than under "rote" conditions of learning. Experiment IV suggests one way of attacking this problem. If"number of related associative tasks"is used as a measure of "meaningful context" for vocabulary learning, this experiment supports the position that speed of mastery of a listening comprehension task is a function of meaningful context assessed in this fashion. Which of the tasks should come first in order that competence in the others will proceed most efficiently? On the basis of these studies, it seems likely that tacting (a picture as a stimulus, speaking as a response) is one task which should come early in the instructional sequence.

Conclusions and Implications for Research

Our studies of sequence have focused on only one kind of problem in the teaching of French, the sequence of listening and speaking for a limited set of utterances. Although the central question of optimum sequence of different utterances was largely ignored, the method we have used may have value for broader research questions. We have found it helpful to discuss listening and speaking by specifying the particular task involved for each term. Four different definitions of listening and three of speaking have been presented in the form of task categories. It may be desirable to pose questions of sequence by specifying the order of such tasks.

The results of the previous investigation indicated that where discrimination learning involved an associative task which was the reverse of the subsequent speaking task, facilitation was clearly evident. The student responded in the listening or discrimination task by identifying a term (circling a word) which was similar to the stimulus of the speaking task; the discrimination training, therefore, affected subsequent speaking behavior through what simply appears to be associative learning.

The study of facilitation of one task through the mastery of a reverse task was broadened in Experiment III to include many other kinds of related associative learnings. By extending the scope of tasks beyond simply listening and speaking, it was possible to deal with certain aspects of the problem of "meaningful context" for vocabulary learning under these experimental conditions. Within the limits of the experiment it was demonstrated that the ease of learning for one particularly associative vocabulary task was a function of one characteristic of "context," the number of related associative tasks already taught.

Posing questions of sequence by specifying the order of the formal and associative tasks provides a large number of permutations; hence, the selection of an experimental treatment involving a task sequence will need to be guided by theoretical considerations. For example, echoic responding and tacting might be undertaken simultaneously rather than separately. It might also be possible to evaluate the usefulness of having students learn the formal phonetic features of the second language by introducing discrimination tasks involving writing in phonetic notation. The effect of such training upon subsequent listening and speaking with comprehension could then be assessed.

The results of the first and second experiments suggest that, at least with the type of instructional materials used, having pupils in the primary grades learn to speak these utterances with comprehension, before they learn to listen and understand them, is a more efficient sequence than the reverse, learning to listen before learning to speak. Acquiring appropriate vocal responses very early in foreign language instruction appears to facilitate subsequent learning of listening comprehension tasks. The replication experiment permits us to reject the interpretation of the results in terms of the effects of recency, but generalization to a greater variety of teaching situations calls for confirmation of these results with other types of instructional materials.

A serious weakness of much educational research has been the fact that instructional treatments of any appreciable length have not been used. Only through gross extrapolation may conclusions regarding a course of study lasting months or years be made from experiments an hour long. Together with studies of a highly limited and controlled nature, it is essential that research in this field give more attention to the development of instructional problems which deal with the cumulative effect of one day's learning upon the next. It was this problem of sequence that was the major concern of the investigation just reported.

Long-term studies have been avoided in education partly because they usually involve uncontrolled variables. In the experiments which have been reported, the modified language laboratory situation, using both slides and tape recordings, provided a fairly realistic and yet highly controlled condition for the study of instructional variables for a two-week period. In the development of such instructional programs, we found it was useful to try out brief tape-recorded materials with one or two individual subjects. After revision, an expansion of the program was tested with small groups. This procedure of improving and enlarging the program, as well as increasing the number of subjects at each stage, was a relatively efficient method of producing materials for a week or two of instruction. It should be noted that even two weeks of instruction is too short an interval to provide an adequate test for major questions of sequence.

The strategy of behavioral analysis adopted in this series of investigations may prove helpful in clarifying the problems of instruction in phonology for foreign language teaching. By specifying in behavioral terms different definitions of listening on the one hand, and speaking on the other, fairly precise research questions may be formulated. It remains to be determined whether this approach will produce the kind of research that will result in actual improvement of classroom instruction.

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